MODIFICATION, ELABORATION AND EMPIRICAL EVALUATION OF A PSYCHOLOGICAL OWNERSHIP STRUCTURAL MODEL

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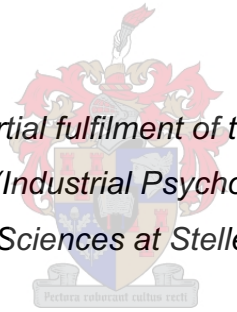

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ABSTRACT

The level of work performance attained by an individual employee is the expression of the lawful interaction of a complex nomological network of latent variables that characterise the individual and his or her work environment. A critical latent variable in this nomological network that influences work performance is *psychological ownership. Psychological ownership* is a unidimensional, intrapersonal psychological state (affective, cognitive and conative) in which an employee develops an attachment to a target of ownership (job or organisation), through specific actions (routes) aimed at the satisfaction of specific human motives (roots). It is a crucial psychological state that a company needs to cultivate and foster in its employees if it wishes to attain competitive advantage in the market. A substantive number of studies have empirically demonstrated a link between *psychological ownership* and a range of desirable behaviours and attitudes such as organisational citizenship behaviour, organisational commitment, job satisfaction and work engagement.

The objective of this study was to modify, elaborate and empirically evaluate the *psychological ownership* structural model developed by Lee (2017). The overarching research-initiating question that underpinned this study was therefore: What other latent variables and critical psychological conditions, besides those identified by Lee (2017), create variance in *psychological ownership*? Furthermore, the study also focused on the question concerning the potential reciprocal relationship between performance outcomes and *psychological ownership*: How do performance outcomes create variance in the psychological state of *psychological ownership*?

An elaborated explanatory *psychological ownership* structural model, derived through theorising, was proposed. An *ex post facto* correlation design, with structural equation modelling (SEM) as the analysis technique, was used to empirically evaluate the second-generation *psychological ownership* structural model. The final sample comprised of 340 permanent, full-time employees across various industries, organisations, job levels and countries. The psychometric properties of the measurement instruments were investigated via item analysis and dimensionality analysis. Successful operationalisation of the latent variables that comprise the structural model was confirmed by the finding of close measurement model fit and satisfactory measurement model parameter estimates. The revised *psychological ownership* structural model obtained reasonable fit. Support was obtained for 20 of the 23 proposed path-specific substantive hypotheses. Only one hypothesis was not corroborated and two could not be tested. The study concludes with the

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theoretical and managerial implications of the research findings, the limitations of the study and recommendations for future research.

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OPSOMMING

Die vlak van werksprestasie wat deur ‘n individuele werknemer bereik word is die uitdrukking van die wetmatige interaksie van ‘n komplekse nomologiese netwerk van latente veranderlikes wat die individu en sy of haar werksomgewing kenmerk. ‘n Kritieke latente veranderlike in hierdie nomologiese netwerk wat werksprestasie beïnvloed is *sielkundige eienaarskap*. *Sielkundige eienaarskap* is ‘n eendimensionele, interapersoonlike sielkundige toestand (affektief, kognitief, en konatief) waarin ‘n individu ‘n verbondenheid tot ‘n teiken van eienaarskap (beroep of organisasie) ontwikkel, deur spesifieke aksies (roetes) wat gemik is op die bevrediging van spesifieke menslike behoeftes (oorsprong). Dit is ‘n noodsaaklike sielkundige toestand wat ‘n maatskappy in sy werknemers behoort te ontwikkel en bevorder indien die maatskappy ‘n mededingende voordeel in die mark wil verseker. ‘n Beduidende aantal studies het ‘n empiriese verband aangetoon tussen *sielkundige eienaarskap* en ‘n reeks wenslike gedragsvorme en houdings soos organisatoriese burgerskapsgedrag, organisatoriese toewyding, werkstevredenheid en werksbetrokkenheid.

Die doelstelling van hierdie studie was om die *sielkundige eienaarskap* strukturele model ontwikkel deur Lee (2017) aan te pas, uit te brei, en empiries te evalueer. Die oorkoepelende navorsings-inisiërende vraag wat hierdie studie onderlê het, was dus: Watter ander latente veranderlikes en kritieke sielkundige toestande, buiten dié wat deur Lee (2017) geïdentifiseer is, veroorsaak variansie in *sielkundige eienaarskap*? Verder het die studie ook gefokus op die vraag rakende die potensiële wedersydse verwantskap tussen werksprestasie-uitkomste en *sielkundige eienaarskap*: Hoe skep werksprestasie-uitkomste variansie in die sielkundige toestand van *sielkundige eienaarskap*?

‘n Uitgebreide verklarende *sielkundige eienaarskap* strukturele model, afgelei deur teoretisering, was voorgestel in hierdie studie. ‘n *Ex post facto* korrelasieontwerp, met strukturele-vergelyking-modellering (SEM) as die ontledingstegniek, is gebruik om die tweede-generasie *sielkundige eienaarskap* strukturele model empiries te evalueer. Die finale steekproef het bestaan uit 340 permanente, voltydse werknemers vanuit verskillende industrieë, organisasies, posvlakke en lande. Die psigometriese eienskappe van die metingsinstrumente is deur itemontleding en dimensie-ontleding ondersoek. Die suksesvolle operasionalisering van die latente veranderlikes waaruit die strukterele model bestaan is bevestig deur die bevinding van goeie metingsmodel pasgehalte en bevredigende metingsmodelparameterskattings. Die hersiene *sielkundige eienaarskap* model het redelike pasgehalte getoon. Steun is vir 20 van die 23 voorgestelde baan-

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spesifieke substantiewe hipoteses verkry. Slegs een hipotese is nie bevestig nie, en twee kon nie getoets word nie. Die studie sluit af met die teoretiese- en bestuursimplikasies van die navorsingsbevindinge, die beperkinginge van die studie, en voorstelle vir verdere navorsing.

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CHAPTER 1

INTRODUCTORY ARGUMENT

1.1. INTRODUCTION

Organisations are consciously coordinated social units, composed of individuals that function on a relatively continuous basis to achieve a common goal or set of goals (Robbins & Judge, 2013). Organisations have a responsibility towards society and equity holders to "efficiently combine and transform scarce factors of production into products and services with economic utility" (Theron, 2013, p. 414). Theron (2019) argues that the economic principle guides organisations in this endeavour. It requires and expects organisations to produce and attain the highest possible output of need-satisfying products and services, with the lowest possible input of production factors. The compliance of public and private sector organisations with the commands of the economic principle is, therefore, in the best interest of society, shareholders and owners.

Organisations have a significant impact on society and the environment in which they operate. More specifically, they impact the quality of the social environment within which people work (Robertson, Callinan & Bartram, 2002). They provide people the opportunity to meet certain individual needs (Fryer & Payne, 1986) such as power, authority, control, self-esteem, status, meaning, money and security. Moreover, an organisation's economic effectiveness has social effects (employment and standard of living) in that the success or failure of an organisation has an impact on people (customers, suppliers, shareholders and the public at large) (Robertson *et al.,* 2002). Since organisations transform scarce resources into goods and services to meet society's needs, they also have an impact on the environment. Although the primary objective of organisations is the maximisation of profit, relative to the capital used to generate that profit, more recently, organisations have the added responsibility of integrating triple-bottom-line thinking (profit, people and planet[1]) into operations, corporate culture and strategy (Gimenez, Sierra & Rodon, 2012).

Organisations operate in a "macroenvironment" (Hough, Strickland, Gamble & Thompson, 2011, p. 58) with demographic, technological, labour market and competitive trends forcing them to continuously innovate and change how they operate. This entails increasing employee productivity and cutting costs (Coetzee & Schreuder, 2016), while maintaining

[1] The triple bottom line requires organisations to approach profit in a manner that not only ensures that its employees and the environment are not abused, but also that its employees flourish psychologically and physically, with the environment benefiting from the operation of the organisation.

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employee engagement and well-being. Along the same lines, the world of work is changing, creating new challenges such as gaining employee effort and commitment without promising job security. This involves determining how to motivate and encourage employees to be empowered workers, giving their all today, knowing that they may lose their jobs tomorrow (Yunker, 1996). Furthermore, as an organisation's size increases, so does the difficulty and complexity of managing individual performance. Individuals tend to identify with their particular part or department within the organisation and have difficulty owning general organisational objectives and goals (Robertson *et al.,* 2002).

These challenges place pressure on industrial psychologists and human resource managers to "add value" (profit), while ensuring that employees (people) flourish psychologically and physically, and act in (green) ways that benefit the environment (planet). The role of the industrial psychologist and human resource managers consequently involves improving organisational performance (as judged in terms of the triple-bottom-line criteria) by considering the external environment's impact and competitive pressures on performance and behaviour, while tapping the potential of the company's human capital (knowledge, skills, abilities and other characteristics) (Dessler, 2013). This entails treating people as an "asset" or organisational resource, worthy of investment.

This argument is based on the fact that an organisation's effectiveness is the result of the level of individual and collective employee performance (i.e., teams and organisational units) and their success of attaining these shared goals. Labour therefore constitutes a pivotal production factor due to the fact that organisations are operated and managed by people. Committed, highly trained employees, as opposed to machines, have consequently become organisations' main competitive advantage (Coetzee & Schreuder, 2016). When an organisation has a competitive advantage over rivals, it means that it has managed to develop a distinct, yet difficult to emulate, 'core' competency that is superior to that of its competitors.

In other words, the extent to which organisations are able to succeed at serving society, with the triple-bottom-line in mind, depends significantly on the work performance (structurally interlinked behaviour/competencies and outcomes) of its workforce. The performance of its workforce, in turn, depends on the quality of the workforce, and the manner in which it is utilised and managed. Industrial psychologists and human resource managers are therefore required to implement an integrated array of human resource (HR) interventions to improve employee performance and well-being that contributes to profitable

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production and environmental green behaviour[2], while illustrating the utility of their interventions through financial indicators.

The behaviour of working man[3], however, is an extremely complex phenomenon. The level of performance attained by an individual is the expression of the lawful interaction of a complex nomological network of latent variables that characterise the individual and his or her work environment (Myburgh, 2013). This is based on the philosophical assumption of Determinism that concerns the idea that nothing in Nature[4] occurs by chance (Bandura, 1978). Determinism legitimises the attempt by the HR function to enhance employee performance and well-being through an integrated array of interventions. More specifically, Determinism represents the philosophical position that the levels of the latent variables comprising the performance structural model at time *t* are the inevitable and necessary result of the levels of latent variables characterising the employee and his/her work environment at a point in time preceding *t* (Hoefer, 2016). In the context of Industrial Psychology, it implies that the behaviour of working man at any given time, is the result of an interaction of latent variables within a complex nomological network. In principle, the behaviour of working man should thus be explainable in terms of probabilistic behavioural regularities in that if ξ changes, then η changes along with it. Behaviour is therefore not assumed to be a random event and performance is conceptualised as a multidimensional construct.

The job performance theory, developed by Campbell (1990), argues that people's actions have an impact on the organisation's goals, and that performance *is* behaviour. This behaviour can either be prescribed as part of the job or outside of the prescribed duties. In terms of job behaviour relevant to organisational performance, Wright, Gardner and Moynihan (2003) argue that three main categories emanate throughout literature. This includes in-role, extra-role and dysfunctional behaviour. In-role behaviour is largely based on commonly accepted norms and job requirements. Extra-role behaviour is the behaviour outside of that which is required from an employee in a job, such as organisational citizenship behaviour (OCB). And lastly, dysfunctional (counter-productive) behaviour, as

[2] This line of reasoning suggests that employee green behaviour should be regarded as an additional behavioural performance dimension or competency along with the behavioural performance normally regarded as necessary for the effective and efficient functioning of the organisation's core operations. In addition to being a determinant of performance, employee well-being is also affected by performance. It is thereby, however, not implied that employee well-being should be promoted merely because of its instrumentality in achieving high employee performance. In the final analysis, employee well-being should be pursued as it is the morally right thing to do.

[3] The phrase 'working man' in this context refers to any member of the species *homo sapiens* and is thus used as a gender neutral term (Theron, 2019).

[4] The term Nature is used here in the sense that Margenau (1950) used the term to refer to everything that exists. It refers to the physical reality but also the behaviour and experiences of man.

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described by Sackett and DeVore (2002), is behaviour or activities (in-role or extra-role) specifically aimed at harming the organisation.

The construct of performance encompasses both competencies and outcomes (Binning & Barrett, 1989; Myburgh, 2013). Competencies and outcomes allow for the accurate assessment of the performance of individuals. This is done by properly defining behavioural performance constructs in terms of clearly specified behaviour and by defining latent outcome variables in terms of the clearly specified results. Competencies are "a set of behaviours that are instrumental in the delivery of desired results or outcomes" (Robertson *et al.,* 2002, p. 7). Outcomes on the other hand, are the results that a job has been designed and created to achieve. This is clearly illustrated in a model of competency (employee performance) proposed by Robertson *et al.* (2002). The model consists of four main categories (domains) of latent variables, namely competency potential, competencies (actual behaviour), results or outcomes, and the context (situational variables) as moderating variable.

Competency potential refers to the latent individual characteristics or attributes (including knowledge, skills, abilities and personality) that directly and/or indirectly determine the level of competence that employees achieve on the latent competencies that (partially) constitute performance and thus determine (along with situational variables) whether employees perform competently in the workplace. Competencies are the abstract representations of specific themes in bundles of related observable behaviour, driven by a nomological network of constructs (competency potential, situational characteristics and competency potential*situation characteristics latent interaction effects), which, when exhibited on a job, would constitute high job performance and would (probably, depending on situational constraints/opportunities) lead to job success defined in terms of the outcomes for which the job exists. A competency is therefore a behavioural performance construct that varies in magnitude (Theron, 2017a). Latent result variables, in turn, refer to the goals or outcomes that the job exists to achieve and that competence on the latent competencies are meant to attain. Contextual latent variables refer to implicit or explicit situational factors that influence how individuals behave within the work setting. These include latent organisational characteristics (e.g., job characteristics, managerial competencies and competency potential, reward systems, formalisation and the physical environment) and other variables outside the direct work setting that could impact the competencies displayed by an individual. These variables could influence an individual's effort and their ability to produce the desired set of behaviour.

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Contextual latent variables could thus influence the level of competence achieved on competencies and/or the standard achieved on outcome variables by moderating the effect of competency potential latent variables on competencies, and/or by moderating the effect of latent competencies on latent outcome variables. However, sometimes an individual displays competence on the required behavioural latent variables or necessary competencies, but the impact of certain situational factors prevent the desired outcomes or results from being achieved. It is therefore important to distinguish between competencies (latent behavioural variables like visioning or analysing) and latent results or outcomes (e.g., client satisfaction, market reputation or quality of production output) (Robertson *et al.,* 2002). Ultimately, performance should be interpreted as a structurally interrelated set of latent behavioural competencies and latent outcome variables (Myburgh, 2013). In the final analysis, employees are employed and paid to achieve specific outcomes by performing specific actions. Industrial Psychology, as a discipline, isolates this behaviour and the outcomes that this behaviour is instrumental in achieving, as the facet of Nature it wants to explore with the aim of understanding, explaining and improving it.

The objective of Industrial Psychology is firstly, to formulate credible and valid psychological explanations of the behaviour of working man. Secondly, to demonstratively affect efficient and equitable improvement in the performance of working man through an integrated set of HR interventions, aligned with the HR strategy (derived from, and aligned to the business strategy). And lastly, to contribute to the company's competitive advantage, through the improvement of work performance (through HR interventions based on credible and valid explanations) and ensuring alignment to the business strategy (Theron, 2017a).

The HR function therefore justifies its inclusion in the family of organisational functions through its commitment to the contribution towards organisational goals, as well as the creation of a specific need-satisfying product or service (that which the organisation sets out to produce). The HR function contributes to the achievement of satisfactory performance on all three dimensions of the triple-bottom-line by optimising and enhancing employee work performance. Since the richly interconnected nomological network of latent variables that underlie work performance can be 'uncovered'[5], industrial psychologists are able to proactively and reactively influence work performance through stock and flow interventions aimed at affecting malleable and non-malleable determinants of work performance (i.e., the latent competency potential variables and latent situational characteristics) (Theron, 2017a).

[5] Enclosing the term uncover with quotation marks formally acknowledges that there is no physical nomological net of latent variables that exist "out there" to be dis-/uncovered. The latent variables that comprise a nomological net are man-made abstract ideas created by man's abstract thinking ability/fluid intelligence.

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The success of these interventions and effectiveness in enhancing performance (i.e., the level of competence achieved on the competencies and the standard achieved on the latent outcomes) depends on the valid understanding of that which determines performance, and a detailed understanding of the job/task in which the employee is supposed to perform. Industrial Psychology embodies the conviction that in principle, these interventions are possible due to the fact that human behaviour is determined, albeit complexly so, as argued previously. Consequently, researchers and practitioners have developed constructs to conceptualise psychological characteristics and psychological states (determinants) that influence performance.

According to Becker and Huselid (1998), HR practices have a direct impact on employee motivation, skills, job design and work structures. Certain levels of productivity, creativity and discretionary effort are elicited by these variables, which as a result, translates into improved operating performance. This impacts growth and profitability and subsequently has a direct effect on the firm's market valuation. Therefore, the human resource manager should be acknowledged as a valuable business partner, properly planning and managing human capital, making work meaningful to employees, while focusing on the core of the business in order to contribute to organisational success.

Industrial psychologists and human resource managers add valuable skills and knowledge to companies by empirically studying individual differences, behaviour in job performance (and the nomological net that underpins it) via the scientific method or scientific techniques (Coetzee & Schreuder, 2016). High quality decisions that improve overall organisational effectiveness and bottom line performance, are the result of these scientific decision-making techniques (Coetzee & Schreuder, 2010; Cartwright & Cooper, 2012). Industrial Psychology contends that the scientific method maximises the probability of valid explanations[6] and conclusions on the validity of hypotheses (or the assertions made about Nature), which in turn, serves the epistemological ideal of science (Theron, 2017a).

Babbie and Mouton (2010) developed a framework to organise one's thinking about the practice of scientific research. These scholars propose that there are three distinct worlds in which scientists operate; World 1: the world of everyday life, World 2: the world of hypotheses and theory (science) and World 3: the world of 'metascience.' These worlds do not operate independently of one another as they enable scientists to select phenomena from World 1 and generate "truthful (valid/plausible) descriptions and explanations of the

[6] Valid explanations are permissible explanations in the sense that the explanations are compatible with empirical observations (i.e., explanations that survived one or more opportunities to be falsified) (Popper, 1972). Explanations will only serve the technical interest if the explanations are valid.

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world" via scientific enquiry in World 2 (Babbie & Mouton, 2010, p. 7). Metascience refers to the metaphysical reflection on the essential nature of science and scientific research, with the ultimate aim of making sense of science and improving the ability of scientific enquiry to serve the cognitive interest (Habermas, 1972) it regards as relevant. This led to the development of 'metatheories', such as the positivistic paradigm from which Industrial Psychology pursues its technical interest of enhancing employee work performance in the interest of the organisation, its employees and the environment. Positivistic metatheory of science believes the purpose of science is control of events in World 1. This positivistic science believes this can be best achieved by explaining the phenomenon by dissecting the to be studied phenomenon in World 1 (working man in the case of Industrial Psychology) into measurable components. This is done in order to develop hypotheses on the nature of the relationship between these components, to empirically test the hypotheses and to derive practical steps aimed at influencing the phenomenon of interest in World 1 (Babbie & Mouton, 2010).

In line with this, positive psychology refers to the concept that psychology is not only about helping people to exist, but also to flourish (Keyes & Haidt, 2003). From this positivistic perspective of improving the human condition (Seligman & Csikszentmihalyi, 2000), a need exists to determine how feelings of ownership influence employee work performance (World 1) by investigating the construct of *psychological ownership* (World 2).

As mentioned, employee work performance, which is seen as a structurally interrelated set of behavioural competencies and latent outcomes, is complexly determined by a nomological network of latent variables that characterise not only the employee, but also the context. The nomological net of determining variables is vast and the latent variables comprising the net are richly interconnect. Moreover, first- and higher-order interaction effects exist along with feedback loops that ensure a dynamic system. A critical latent variable in this nomological network that directly and indirectly influences the performance of working man is *psychological ownership.* In order to affect and ultimately improve work performance, it is important to investigate and understand the determinants and consequences of *job-based* and *organisation-based psychological ownership* (i.e., the manner in which the construct is embedded in a larger nomological network).

1.2. PSYCHOLOGICAL OWNERSHIP

The concept of *psychological ownership* has been studied in numerous contexts and has been theoretically and empirically distinguished from other constructs, such as organisational identification and organisational commitment (Pierce, Kostova & Dirks,

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2001). Some scholars argue that humans have an innate need to possess (Burk, 1900; Weil, 1952), while others believe that the psychological state is learned in the early development process (Furby, 1978). Isaacs (1933, p. 225) observed that feelings of ownership emerge at a young age and noted, "what is mine becomes (in my feelings) a part of ME." Nonetheless, this illustrates that the psychology of possession is deeply rooted in a person. Pierce *et al*. (2001, p. 299) proposed the definition of *psychological ownership* as the psychological state in which individuals feels that the target of ownership, or part thereof, is "theirs" ("mine"). The target of ownership (e.g., organisation or job) can be material or immaterial in nature, and helps to define the individual, thereby assuming importance. According to Pierce *et al*. (2001), *psychological ownership* has cognitive, conative and affective elements and differs from legal ownership in the sense that there is no formal recognition from others, but that feelings of emotional attachment and ownership are manifested at an individual level.

In order to determine "why" this psychological state exists, Pierce *et al*. (2001, p. 300) proposed that it emerges because "it satisfies certain human motives." Also known as the *roots of psychological ownership*, these include the need for 1) efficacy and effectance, 2) self-identity, and 3) having a place (sense of belonging or belongingness). Effectance refers to a person's desire to explore, control and "be the cause" of changes in one's environment. This leads to feelings of efficacy, which is the human need to feel capable in a given domain (Bandura, 1997). Self-identity refers to the idea that possessions are regarded as extensions of the self (Belk, 1988) and therefore reflects one's identity, individuality and core values (Dittmar, 1992). And lastly, ownership provides territorial satisfaction, namely stimulation, personalisation of a space, and control over space (Porteous, 1976). Avey, Avolio, Crossley and Luthans (2009) extended Pierce *et al.*'s (2001) conceptualisation by including *accountability* as a dimension. Pierce and Jussila (2011), on the other hand, added the need for *stimulation,* as the fourth dimensions. Nevertheless, these roots or human motives motivate an individual to travel down the *routes to psychological ownership*.

The routes define "how" organisational members come to feel this psychological state (Pierce *et al*., 2001, p. 301). These include 1) controlling the target, 2) coming to intimately know the target, and 3) investing the self into the target. These *routes* were used in further research as building blocks to identify various antecedents of *psychological ownership* (Dawkins, Tian, Newman & Martin, 2017).

On the basis of regulatory focus theory (Higgins, 1997; 1998), Avey *et al*. (2009) suggested two independent and distinct forms of *psychological ownership*, namely promotive and

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preventative. These scholars suggest that the construct of promotive *psychological ownership* is rooted in four human needs: *self-efficacy, self-identity, belongingness* and *accountability*. Promotive *psychological ownership* concerns a greater sense of belongingness to a target, a feeling of efficacy about working with the target, feeling accountable for what happens to the target and a feeling of personal identification with the target (Avey, Wernsing & Palanski, 2012). Preventive *psychological ownership* is generally associated with increased territoriality and possessiveness over the target, and concerned with avoiding punishment and meeting obligations (Avey *et al*., 2009).

Within the organisational setting, two distinct foci of possession have emerged. These are *job-based* and *organisation-based psychological ownership*. *Job-based psychological ownership* concerns the psychological attachment employees have to their specific role or job. *Organisation-based psychological ownership* in contrast, relates to possessive feelings that employees have towards the organisation as a whole (Dawkins *et al.,* 2017). *Organisation-based psychological ownership* has been the main focus of studies conducted to date, with a limited number focusing on *job-based psychological ownership*. As a result, the need exists for further accumulation of knowledge of this construct within this focus area[7].

Psychological ownership could be classified as a competency potential latent variable[8], part of the complex nomological network underpinning employee performance. In order to better understand the manner in which *psychological ownership* is embedded in the nomological network of psychological constructs one must consider its antecedents and outcomes (Avey *et al*., 2009). A substantive amount of literature has investigated its various antecedents and individual level outcomes (such as emotional, attitudinal, motivational and behavioural outcomes), as well as the mediating relationship of *psychological ownership* and the various workplace outcomes.

Some of the antecedents that increase or influence *job-based psychological ownership* are job complexity (Brown, Pierce & Crossley, 2014), autonomy (Mayhew, Ashkanasy, Bramble & Gardner, 2007), leadership (Bernhard & O'Driscoll, 2011) and employee emotional and spiritual intelligence (Kaur, Sambasivan & Kumar, 2013).

In terms of outcomes of *psychological ownership*, literature suggests that some of the

[7] The current study contends that ultimately, in the greater nomological network of latent variables that describe the psychological mechanism that regulates the level of *job-based* and *organisational-based psychological ownership*, both these forms of *psychological ownership* should be considered.

[8] In comparison to traditionally identified competency potential latent variables, the idea of classifying psychological states as competency potential latent variables, seem to be a somewhat neglected. Nevertheless, psychological states have important direct or indirect influences on *job performance* that require investigation.

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desirable employee attitudes include affective commitment (Liu, Wang, Hui & Lee, 2012; Mayhew *et al.,* 2007; Sieger, Bernhard & Frey, 2011), organisational commitment, job satisfaction, organisation-based self-esteem (Van Dyne & Pierce, 2004), work engagement (Ramos, Man, Mustafa & Ng, 2014) and intention to stay (Zhu, Chen, Li & Zhou, 2013). Some of the behavioural outcomes include extra-role behaviour such as OCB, helping behaviour (Van Dyne & Pierce, 2004) and stewardship behaviour (Henssen, Voordeckers, Lambrechts & Koiranen 2014). These findings indicate that feelings of ownership have desirable attitudinal and behavioural outcomes.

However, *psychological ownership* also has potential negative outcomes that cannot be ignored. In terms of the dark side of *psychological ownership*, scholars argue whether territoriality is an outcome (Brown, Lawrence & Robinson, 2005) or part of the construct (Avey *et al*., 2009). Brown *et al*. (2005) suggest that these constructs are related, but distinct. Other negative outcomes include knowledge holding, workplace deviance behaviour, resistance to change (Pierce & Jussila, 2011) and escalation of commitment (Dawkins *et al.,* 2017).

Keeping the dark side of *psychological ownership* in mind, it is evident that *psychological ownership* not only has the potential to influence desirable employee behaviours, but also to determine the level of *performance* an employee achieves. However, limited research has investigated how *job-based psychological ownership* structurally relates to job performance (Brown *et al.,* 2014; Mayhew *et al*., 2007; Van Dyne & Pierce, 2004).

Due to South Africa's turbulent history and current unstable political and economic climate, many factors influence the work environment and employee performance. "Before the end of apartheid in 1994 South Africa was a brain magnet" (Holden, 1999, p. 171). With the implementation of BBBEE (Broad Based Black Economic Empowerment) and affirmative action, valuables skills have started leaving the country (also known as the brain drain). As a result, companies have become anxious to retain talent, especially executives (South Africa: Brain Drain, 2006). However, it is thereby not implied that the emigration of talented South Africans is solely to be ascribed to BBBEE and affirmative action. Numerous other factors, such as globalisation, crime, economic conditions also play a role. Nevertheless, this demonstrates that instilling *psychological ownership* in South African employees is more important now, than ever. *Psychological ownership* is a crucial psychological state that an organisation needs to cultivate and foster in its employees if it wishes to attain competitive advantage in the market (Brown, 1989; Olckers & Du Plessis, 2012). The responsibility of obtaining a richer understanding of this construct and the manner in which it is embedded

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in a larger complex nomological network of causes and consequences therefore rests on the discipline's research practitioners.

1.3. RESEARCH-INITIATING QUESTION

At the core of the process of managing individual employee behaviour, is the need to direct that behaviour towards the production of results that help attain organisational goals (Robertson *et al*., 2002). However, to infer practical interventions that can be utilised to manipulate the determinants of performance to levels that are conducive to the desired behaviour requires that the determinants of the behaviour, and the manner in which they structurally combine to affect performance, are validly understood. Psychological states, such as *job-based psychological ownership,* play an important role in determining the levels of performance that employees achieve. The level of *psychological ownership* can like-wise only be influenced via an array of HR interventions, if its determinants and the manner in which they structurally combine to affect *psychological ownership* are validly understood.

Job-based psychological ownership is determined by a complex interaction of a number of object-related, intra-individual, and contextual factors (Pierce, Kostova & Dirks, 2003). This implies that the nomological net in which *psychological ownership* is embedded comprises a large number of richly interconnected latent variables, in addition to being characterised by interaction effects and feedback loops (Cilliers, 1998). Pierce *et al.* (2003) referred to the dynamic nature of this construct by suggesting that "the state of *psychological ownership*, although potentially latent within each individual, does not necessarily always occur and it is not equally strong across individuals, targets and situations" (Pierce *et al.,* 2003, p. 103). These differences in *psychological ownership* are due to a large number of specific factors in the environment, the target and individual. To be able to influence *psychological ownership* in a rational and purposeful manner, it must be determined how differences in this myriad of determining factors contribute to *psychological ownership*.

The assumption that *psychological ownership* is complexly determined implies that the understanding of the causes of differences in the levels of *psychological ownership* does not lie in any specific path or latent variable, but rather that it is spread across the whole of the nomological network. This in turn suggest that a single research study cannot expect to construct [9] the full psychological mechanism regulating the levels of *psychological*

[9] The use of the verb 'construct' again formally acknowledges the point made earlier that there is no physical nomological net of latent variables that exist "out there" to be *dis-/uncovered*. The latent variables that comprise a nomological net are man-made abstract ideas created by man's abstract thinking ability/fluid intelligence. The structural model representing an hypothesis on the nature of the nomological net is built/constructed from these abstract conceptual building blocks. The structural model is therefore an "as if" representation created by man's fluid intelligence and imposed on phenomena in World 1. The representation is regarded as permissible (i.e., valid) if it is compatible with observations made in World 1.

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ownership experienced by employees. The accumulation of knowledge (through a sequence of cumulative studies) is the key to proper understanding of the nomological network of latent variables regulating the level of the *psychological ownership* construct. Cumulative research studies enable subsequent researchers to modify and elaborate structural models developed by the researchers that preceded them. It is only through cumulative research that the discipline can aspire to achieve a reasonable approximation of the psychological mechanism regulating the levels of *job-based psychological ownership* experienced by employees.

The rationale behind building on existing knowledge through a sequence of cumulative studies is that meaning (i.e., explanations) is distributed across the nomological network. The nomological network is a complex and dynamic structure and meaning, therefore, lies within the dynamic whole. Once one removes/ignores important parts of an explanatory structural model, it loses meaning. One individual cannot unravel this nomological net alone. It is important to build on existing knowledge, in order to strengthen the conceptualisation and develop a richer understanding of the construct of interest[10].

Through the integration and extension of literature, Lee (2017) developed a conceptual framework to serve as a building block for the development of a comprehensive theory of *job-based psychological ownership*. More specifically, Lee (2017) proposed a first-generation explanatory *psychological ownership* structural model and subjected the model to empirical tests. Support for a reduced version of the model was obtained (Lee, 2017). In the original model it was hypothesised that employees' *motivation to pursue the routes to psychological ownership* is determined by the congruence or incongruence between the perceived ability of the job to satisfy the *psychological ownership roots* and the *salience of the psychological ownership roots* (Lee, 2017). More specifically, it was hypothesised that the manner in which employees' *motivation to pursue the routes to psychological ownership* changes curvilinearly to changes in the *perceived ability of the job to satisfy the psychological ownership roots* and the *salience of the psychological ownership roots,* which is determined by five polynomial latent effects (Lee, 2017). Inadmissible values in the completely standardised factor loadings associated with some of the indicator variables of the polynomial latent effects forced her to eliminate the polynomial latent effects from the original model. Lee (2017) received good fit for the reduced structural model

[10] It is acknowledged that man will never be able to fully grasp the complex nomological network of latent variables underpinning employee performance. This realisation should bring about a sense of humility. Prior studies that have developed extensive explanatory models that attempt to illustrate the fact that employee performance is complexly determined, have been criticised as being too difficult to get one's head around. However, that is an inevitably necessary characteristic of realistic explanatory models. Complex phenomena require complex descriptions.

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(RMSEA=.059). The close fit null hypothesis (H_0: RMSEA≤.05) was not rejected (p>.05). She also obtained support for the majority of the paths in the reduced model.

Lee (2017) specifically focused on some of the antecedents or determinants of *job-based psychological ownership*. With that said, this study builds on the work conducted by Lee (2017) on the determinants of *job-based psychological ownership* by identifying additional antecedents or determinants of *psychological ownership*, but also investigating outcomes or consequences of *psychological ownership* and their potential to feed back onto the construct itself and its determinants.

Bandura (1978, p. 345) stresses the fact that the interaction process between person, situation and behaviour should not be interpreted as unidirectional or bidirectional; “where the person and situation are treated as independent entities and combine to produce behaviour.” He suggests, “from a social learning perspective, psychological functioning involves a continuous reciprocal interaction between behaviour, cognitive and environmental influences” and that “the relative influence of these interlocking factors will vary in different individuals and under different circumstances” (Bandura, 1978, p. 344). This leads to the concept of reciprocal determinism where “people’s conceptions, their behaviour and the environment are reciprocal determinants of each other” (Bandura, 1978, p. 346). Consequently, a question arises concerning a possible reciprocal or feedback relationship between outcomes and psychological functioning. How do performance outcomes feed back into an individual’s psychological functioning or psychological state? Is there a reciprocal relationship?

The latent outcomes that are directly and/or indirectly affected by *job-based psychological ownership* are of specific interest because of the conviction that feedback loops operate in complex systems. In Cilliers’ (1998, p. 4) characterisation of complex systems he states:

> There are feedback loops in the interactions. The effect of any activity can feed back onto itself, sometimes directly, sometimes after a number of intervening stages. This feedback can be positive (enhancing, stimulating) or negative (distracting, inhibiting). Both kinds are necessary.

Therefore, it does not seem unreasonable to argue that the latent outcomes that are directly and/or indirectly affected by *psychological ownership* are psychologically interpreted by employees, and that this interpretation in turn, feeds back onto the antecedents of *psychological ownership* and/or on *psychological ownership* directly.

The overarching research-initiating question that drives this study is the second-generation research-initiating question asking: Why is there variance in *psychological ownership*, when

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statistically controlling for the latent variables included in the reduced Lee (2017) explanatory *psychological ownership* structural model? The research-initiating question of the current research study is therefore: What other latent variables and critical psychological conditions, besides those identified by Lee (2017), create variance in *psychological ownership*? Specifically, the current study also intends focusing on the question concerning the potential reciprocal relationship between performance outcomes and *psychological ownership* that enquires: How do performance outcomes create variance in the psychological state of *psychological ownership*?

The research-initiating question (and therefore also the research objectives) was purposefully formulated as an open-ended question that does not identify the explanatory latent variables that will be added or removed from the first-generation explanatory *psychological ownership* structural model developed by Lee (2017). Unbridled theorising presented in Chapter 2 in response to the research-initiating question will introduce the latent variables that are required to extend the first-generation model into a model that better approximates the psychological mechanism that regulates the level of *psychological ownership* that employees experience. Latent variables have to earn their place in the psychological mechanism that the researcher constructs in Chapter 2.

1.4. RESEARCH OBJECTIVES

The primary objective of this research study is to modify, elaborate and empirically evaluate the *psychological ownership* structural model developed by Lee (2017), by:

- Critically examining the latent variables and paths currently included in the Lee (2017) *psychological ownership* structural model;
- Identifying additional latent variables directly and/or indirectly creating variance in *psychological ownership;*
- Specifically identifying causally down-stream consequences of *psychological ownership* (or the lack thereof) that may directly and/or indirectly feed back onto *psychological ownership*;
- Depicting the potential reciprocal relationship between *job-based psychological ownership* and performance outcomes, in order to demonstrate how they structurally relate;
- Empirically testing the second-generation *psychological ownership* structural model.

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1.5. THESIS STRUCTURE

Chapter 1 provided an introductory argument motivating the importance of building on existing knowledge of *psychological ownership*, which lead to the research-initiating question and research objectives. Accumulative research assists in developing a richer and better understanding of the manner in which *psychological ownership* is embedded in a larger nomological network, and how it relates to *performance*. The following chapter provides a thorough literature review and through theorising, presents an overarching substantive research hypothesis, a set of path-specific substantive research hypotheses and a *psychological ownership* structural model. Chapter 3 outlines the proposed research methodology. This is followed by an evaluation of ethical risks associated with the research in Chapter 4. In Chapter 5, the research results are presented and analysed. The study concludes with the research findings, managerial implications, limitations of the study and recommendations for future research in Chapter 6.

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CHAPTER 2

LITERATURE REVIEW

2.1. INTRODUCTION

The fundamental research challenge is to 'uncover' [11] the complex nomological structure that underlies the behavioural phenomenon of interest. Stated differently, the fundamental research challenge is to ultimately 'reveal' the structural equations that define the hyperplanes describing the manner in which the endogenous latent variables of interest systematically respond to changes in its determinants (Theron, 2017b). This research challenge cannot be met by a single researcher via a single research study. Cumulative research, in which numerous researchers continue with the structural models proposed and tested by their predecessors, is required. Therefore, to contribute to the development of a more penetrating appreciation of the manner in which *job-based psychological ownership* is embedded in a larger complex nomological network of latent variables, the current study aims to modify and elaborate the first-generation explanatory *psychological ownership* structural model proposed by Lee (2017). In order to do so, a description of Lee's (2017) work is required. The theorising underpinning her original model will be examined and the empirical results obtained with regards to her reduced model will be investigated. Decisions concerning which latent variables and paths to retain will be based on the theoretical rigour of her arguments, and whether the path-specific hypotheses obtained empirical support. The current study will subsequently conceptualise additional constructs, and propose additional path-specific research hypotheses for inclusion in the second-generation explanatory *psychological ownership* structural model.

2.2. FIRST-GENERATION EXPLANATORY STRUCTURAL MODEL

Figure 2.1 depicts the original *psychological ownership* structural model proposed by Lee (2017). The author acknowledged that the proposed model does not claim to be the only possible explanation for the phenomena of interest, but rather that it is possible to obtain more than one structural explanation for the same covariance matrix.

[11] The quotation marks acknowledge that, strictly speaking, no nomological structure exists in World 1 (Babbie & Mouton, 2010) that can be *un-/discovered*. Explanatory structural models are *constructed* in World 2 from constructs/latent variables created by the fluid intelligence of man to explain observation made in World 1.

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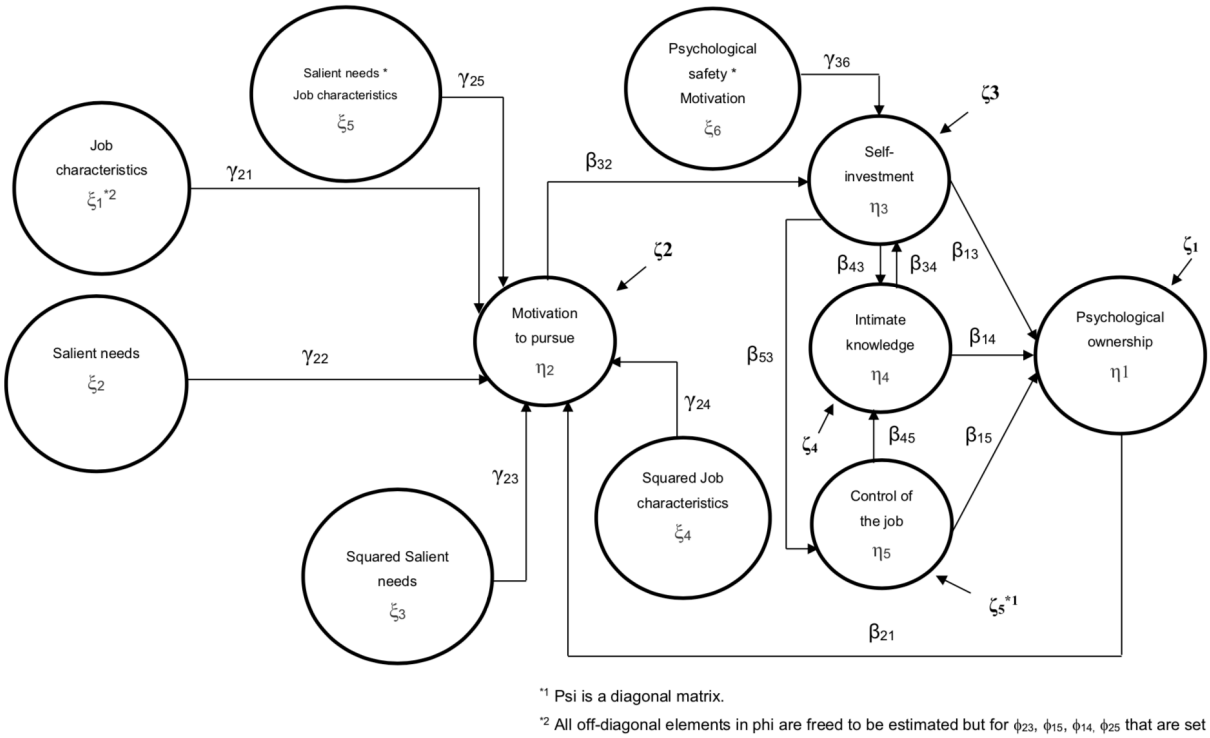

Figure 2.1. **Proposed psychological ownership structural model (Model A)**

Note. Reprinted from *Development and empirical evaluation of an explanatory psychological ownership structural model by Lee, A.* Master's thesis. Stellenbosch: Stellenbosch University, p. 79.

Influenced by Hackman-Oldham's Job Characteristics Model (Hackman & Oldham, 1976) and the revised Job Characteristics Model (Pierce, Jussila & Cummings, 2009), Lee (2017) hypothesised that certain *job characteristics* (skill variety, autonomy, task significance, feedback, task identity) provide the opportunity for the satisfaction of an individual's *psychological ownership root needs* (*efficacy and effectance, self-identity* and *belonging*). The satisfaction of the *root needs* in turn, influences the individual's *motivation to pursue the routes to psychological ownership*. However, "the individual need(s) or motive(s) that is/are satisfied through certain job characteristic(s) have to be experienced to a sufficient degree" in order to motivate the job incumbent to travel the routes to *psychological ownership* (Lee, 2017, p. 49). The degree to which the *psychological ownership root needs* are experienced refers to the *salience* (strength and importance) of the foregoing three root needs to the individual. The other critical aspect that, according to Lee (2017), determines the *motivation to pursue the routes to psychological ownership* is the *perceived ability* of the job to satisfy the *salient root needs*. This suggestion was based on the expectancy theory (Vroom, 1964), which claims that three components interact psychologically to create a motivational force and subsequent behaviour. These components are valence, expectancy and instrumentality. Lee (2017) hypothesised that one must firstly value the rewards that flow from 'traveling' the *routes to psychological ownership* (feelings of ownership; positively

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valenced), secondly, one must expect that any effort of *investing the self* into the job, gaining *intimate knowledge* and taking *control of the job* will lead to successfully travelling the *routes to psychological ownership* (performance; first-order outcome; expectancy). This engagement with the *routes to psychological ownership* could then facilitate the development of *psychological ownership* (second-order outcome). The perceived probability that successful travel of the *routes to psychological ownership* (first-order outcome) will result in the experience of *psychological ownership*, represents the instrumentality component.

In the original model it was hypothesised that employees' *motivation to pursue the routes to psychological ownership* is determined by the congruence or incongruence between *the perceived ability of the job to satisfy the roots* and the *salience of the roots* (Lee, 2017). Due to the fact that Lee (2017) believed that employees' *motivation to pursue the routes to psychological ownership* responds non-linearly to the congruence or incongruence between the *perceived ability of the job to satisfy the roots* and the *salience of the roots,* it was decided to use polynomial regression and response surface analysis. Lee (2017) claimed that it would enable the possibility of describing more intricate non-linear relationships. It would allow for the evaluation of the influence of fit between the two predictors (*the perceived ability of the job to satisfy the roots* (X_1) and the *salience of the roots* (X_2)) on the endogenous outcome variable (*motivation to pursue the routes to psychological ownership* (Y)).

More specifically, it was hypothesised that the manner in which employees' *motivation to pursue the routes to psychological ownership* changes curvilinearly to changes in the *perceived ability of the job to satisfy roots* and the *salience of the roots,* which is determined by five polynomial latent effects (Lee, 2017). The five latent polynomial effects included *the perceived ability of the job to satisfy the roots* (X_1), the *salience of the roots* (X_2), the product or interaction between *the perceived ability of the job to satisfy the roots* and the *salience of the roots* (X_1*X_2), the squared *perceived ability of the job to satisfy the roots* (X^2_1), and the squared *salience of the roots* (X^2_2). The five polynomial latent effects were introduced into the model as phantom variables. Since these variables have no measured indicator variables, they were solely introduced to "achieve a specialized purpose" (Bentler & Raykov, 2000, p. 128), which was to investigate the influence of congruence.

The *routes* were conceptualised as behavioural performance dimensions (Lee, 2017). This was based on Pierce and Jussila's (2011) argument that the *routes* are behavioural components that carry the feelings of ownership within the self after the initial introduction

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and need satisfaction of the target. These routes include *investing the self* into the target, *intimately coming to know* the target, and *control* of the target. It was hypothesised that, in addition to the direct influence that each route has on *psychological ownership*, they also have specified causal paths between them (Lee, 2017). More specifically, *investing the self* into the target was hypothesised to positively affect *intimately coming to know* the target, as well as *control* of the target. *Control* of the target was hypothesised to influence *intimately coming to know* the target. *Intimate knowledge* of the target in turn, was hypothesised to affect *investing the self* into the target.

Based on Kahn's (1990) theorising about personal engagement (which includes aspects of self-investment) the construct of *psychological safety* was introduced as a moderator variable into the model. Kahn (1990) suggested that perceived levels of *psychological safety* positively influences psychological engagement. Thus, "employees who experience a sense of safety, in that they feel they will not experience negative consequences such as to their self-image, status or career, are more willing to take the risk of self-expressing within their job" (Lee, 2017, p. 71). It was therefore postulated that *psychological safety* moderates the effect of an employee's *motivation to pursue the routes* on *investing the self* into the job.

To acknowledge the complexity underlying the nomological network of the *psychological ownership* construct, a feedback loop was proposed. It was hypothesised that feelings of *psychological ownership* positively influence *the motivation to pursue the routes to psychological ownership* (Lee, 2017). This feedback loop was discussed as the motivational effect of *psychological ownership*. In other words, if the root needs are satisfied, and the individual experiences attachment to, or ownership of the job, the employee will be motivated to invest more time and energy (psychologically and physically) into the job (Lee, 2017).

In order to determine the psychometric quality of the indicator variables used to operationalise the latent variables in the structural model, an analysis of the measurement model was conducted (Lee, 2017). When fitting the *psychological ownership* measurement model, the assumptions of univariate and multivariate normality were not met and thus an attempt was made to normalise the composite indicator variables using PRELIS. The attempt at normalisation reduced the discrepancy between the observed sample distribution and the theoretical multivariate normal distribution, but the deviation remained statistically significant. Robust maximum likelihood estimation was consequently used as the estimation technique when fitting the measurement model to the normalised data. Upon initial analysis of measurement model, the model showed close fit (RMSEA=.040; p>.05). However, the

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model results could not be interpreted further because of inadmissible parameter estimates. Inadmissible values in the completely standardised factor loadings[12] associated with some of the indicator variables of the polynomial latent effects forced the author to eliminate the polynomial latent effects from her original model. Consequently, the three paths that had to be deleted were γ_{23}, γ_{24} and γ_{25}. In other words, the latent *squared salience of the roots* effect, the latent squared *job characteristics* effect, and the latent *salience of the roots* x *job characteristics* interaction effect were deleted. This lead to the development of a reduced *psychological ownership* measurement model (Lee, 2017). The fit of the reduced measurement model was evaluated and it obtained good fit (RMSEA=.019; p>.05). This finding was substantiated by various goodness-of-fit indices, the model's standardised residuals, modification indices, parameter estimates and squared multiple correlations (Lee, 2017). It was concluded that the operationalisation of the latent variables comprising the reduced *psychological ownership* measurement model was successful and that it was permissible to fit the reduced *psychological ownership* structural model (Lee, 2017).

When evaluating the fit of the reduced structural model, the exact fit null hypothesis (H_0: RMSEA=0) was rejected (p<.05), in favour of the close fit null hypothesis (H_a: RMSEA>.05), which was not rejected (RMSEA=.059; p>.05). However, the completely standardised structural error variance estimate for *self-investment* (η_3) returned an inadmissible value exceeding one (ψ_{33}=1.219), and the model could not be interpreted any further. Even though the hypothesised influence of *intimate knowledge* on *self-investment* was statistically significant (p<.05), the sign of the regression slope did not agree with the nature of the hypothesised relationship under the directional alternative hypothesis. The author therefore modified the model by removing the path from *intimate knowledge* (η_4) to *self-investment* (η_3) (Lee, 2017).

With β_{34} deleted, the reduced *psychological ownership* structural model (Model B) was refitted. No inadmissible parameter estimates were indicated in the completely standardised solution. The Satorra-Bentler Scaled chi-square was examined (p=.00) and indicated that the exact fit null hypotheses (H_0: RMSEA=0; H_a: RMSEA>0) had to be rejected in favour of H_a: RMSEA>0. The reduced model received good fit (RMSEA=.059) and the close fit null hypothesis (H_0: RMSEA$\leq$.05) was not rejected (p>.05).

The parameter estimates of three specific matrices were interpreted, however, only the unstandardised gamma ($\boldsymbol{\Gamma}$) and beta ($\mathbf{B}$) matrices are reported in the current study. The

[12] Completely standardised loadings larger than one, and hence, squared correlations larger than one were returned.

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unstandardised gamma matrix (Table 2.1) indicates the slope of the regression of the endogenous latent variables (η) on the exogenous latent variables (ξ). The unstandardised beta matrix (Table 2.2) indicates the slope estimates of the relationship between the endogenous variables. Lee (2017) obtained support for the majority of the hypothesised paths in her reduced model.

Table 2.1

Reduced Psychological Ownership Structural Model Unstandardised Gamma Matrix (Model B)[13]

	JC	PON	PS_MOT
PO	- -	- -	- -
MOT	.466*	.457*	- -
	(.057)	(.053)	
	8.126	8.581	
SI	- -	- -	-.009
			(.063)
			-.135
IK	- -	- -	- -
C	- -	- -	- -

* (p<.05)

PO: psychological ownership; MOT: motivation; SI: self-investment; IK: intimate knowledge; C: control of the job; JC: job characteristics; PON: psychological ownership needs; PS_MOT: the interaction between psychological safety and motivation to pursue the routes

Note. Reprinted from *Development and empirical evaluation of an explanatory psychological ownership structural model by Lee, A.* Master's thesis. Stellenbosch: Stellenbosch University, p. 279.

Table 2.1 indicates that two of the three path coefficient estimates were statistically significant (p<.05). H_{02}: $\gamma_{21}=0$ and H_{03}: $\gamma_{22}=0$ were rejected. Thus, the hypothesised effect of *job characteristics* (JC) on the *motivation to pursue the routes towards psychological ownership* (MOT) and the hypothesised effect of *psychological ownership individual route needs* (PON) on the *motivation to pursue the routes towards psychological ownership* (MOT) were supported. H_{010}: $\gamma_{36}=0$ could not be rejected, which means that support was not obtained for the hypothesised moderating effect of *psychological safety* on the effect of the *motivation to pursue the routes towards psychological ownership* on *investing the self* (Lee, 2017).

[13] Throughout the thesis, when reporting unstandardised factor loading, measurement error variance, regression slope coefficient and structural residual error variance, the top value in each cell is the unstandardised parameter estimate, the middle value in brackets is the standard error of the sampling distribution and the bottom value is a z-value used to evaluate the statistical significance of the parameter estimate.

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Table 2.2

Reduced Psychological Ownership Structural Model Unstandardised Beta Matrix (Model B)

	PO	MOT	SI	IK	C
PO	- -	- -	.331* (.079) 4.205	.185* (.059) 3.126	.331* (.071) 4.655
MOT	**-.045** (.060) **-.756**	- -	- -	- -	- -
SI	- -	.544* (.069) 7.887	- -	- -	- -
IK	- -	- -	.477* (.077) 6.162	- -	.155* (.073) 2.118
C	- -	- -	.578* (.056) 10.308	- -	- -

* (p<.05)
PO: psychological ownership; MOT: motivation; SI: self-investment; IK: intimate knowledge; C: control of the job

Note. Reprinted from *Development and empirical evaluation of an explanatory psychological ownership structural model by Lee, A.* Master's thesis. Stellenbosch: Stellenbosch University, p. 280.

Table 2.2 indicates that support was obtained for all of the hypothesised relationships between the endogenous latent variables, except for the relationship between *psychological ownership* and *motivation to pursue the routes towards psychological ownership.* Therefore, H_{09}: $\beta_{32}=0$, H_{013}: $\beta_{13}=0$, H_{016}: $\beta_{43}=0$, H_{011}: $\beta_{53}=0$, H_{015}: $\beta_{14}=0$, H_{014}: $\beta_{15}=0$ and H_{012}: $\beta_{45}=0$ could all be rejected ($p<.05$), except for H_{018}: $\beta_{21}=0$ that could not be rejected ($p>.05$) (Lee, 2017). Table 2.3 indicates the squared multiple correlations for the endogenous variables of Model B, the reduced *psychological ownership* structural model.

Table 2.3

Squared Multiple Correlations for the Endogenous Variables of the Reduced Psychological Ownership Structural Model (Model B)

PO	MOT	SI	IK	C
.484	.485	.272	.333	.327

PO: psychological ownership; MOT: motivation; SI: self-investment; IK: intimate knowledge; C: control of the job

Note. Reprinted from *Development and empirical evaluation of an explanatory psychological ownership structural model by Lee, A.* Master's thesis. Stellenbosch: Stellenbosch University, p. 284.

Table 2.3 shows that 48% of the variance in *psychological ownership* was explained by Model B (the reduced structural model). The model was therefore relatively successful in explaining variance in *psychological ownership*. The model also explained 48% of variance

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in the *motivation to pursue the routes to psychological ownership*. However, the model appeared to be somewhat less successful in its ability to explain variance in the three *routes to psychological ownership* (*self-investment*: .272; *control of the job*: .327; *intimate knowledge*: .333) (Lee, 2017). The final (reduced) *psychological ownership* structural model (Model B) proposed by Lee (2017) is shown in Figure 2.2.

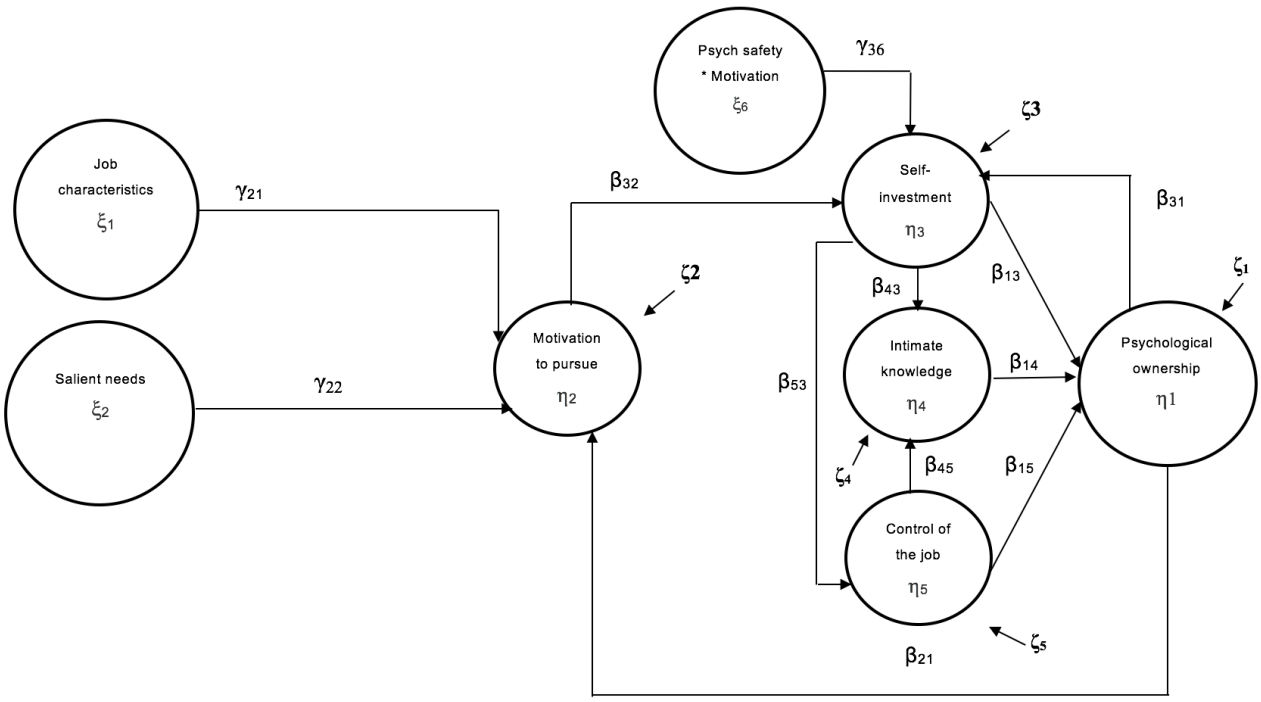

Figure 2.2. **Final (reduced) psychological ownership structural model (Model B)**

Note. Reprinted from *Development and empirical evaluation of an explanatory psychological ownership structural model by Lee, A.* Master's thesis. Stellenbosch: Stellenbosch University, p. 304.

Due to the fact that polynomial regression hypotheses could not be tested as originally intended, they had to be tested through observed score polynomial regression analysis. A separate narrow-focused structural model[14] had to be created as well as an additional overarching substantive research hypothesis (Lee, 2017).

Support was obtained for the hypothesis that *motivation to pursue the routes towards psychological ownership* increases as one moves along the line of congruence from - - to + +. However, support was not obtained for the hypothesis that the *motivation to pursue the routes towards psychological ownership* increases convexly as one moves along the line of congruence from - - to + +. It was therefore concluded that as an employee's *root needs* become more *salient* and the *job characteristics* become more able to satisfy these *salient*

[14] The narrow-focused structural model only contained *motivation to pursue the routes to psychological ownership* as endogenous latent variable and the five polynomial latent effects as exogenous latent variables. The model is depicted as Figure 5.16 in Lee (2017, p. 289). The latent variables were each operationalised via a single composite indicator variable. The model was tested via linear multiple regression.

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root needs, *motivation to pursue the routes towards psychological ownership* increases linearly (not convexly) (Lee, 2017, p. 308).

Furthermore, the conclusions on both H_{08a} and H_{08b} concerning the manner in which "*motivation to pursue the route to psychological ownership* respond to incongruence in *job characteristics* and the salience of the *psychological ownership* needs" were not in line with the proposed substantive hypotheses (Lee, 2017, p. 298). Lee (2017, p. 308) explained that:

> The positive and statistically significant a_4 (coupled with the statistically insignificant a_3, and subsequent non-rejection of H_{08a}: $a_3=0$) implies that the outcome variable changes convexly as the predictor variables move along the line of incongruence from - + to +.

In other words, the *motivation to pursue the routes towards psychological ownership* increased non-linearly as the discrepancy between the *salience of the individual psychological ownership root needs* and the *ability of the job characteristics* to meet these *salient root needs* increased along the line of incongruence outward from 0. The height of the convex response surface, however, "does not significantly differ under the two extreme forms of incongruence" (Lee, 2017, p. 309).

2.2.1. Modification of the first-generation explanatory structural model

Lee (2017) inspected the beta and gamma modification indices for potential additional paths or relationships that can statistically significantly (p<.01) improve the model fit. Six of the nine parameters ($\mathbf{B}$) and four of the twelve parameters (Γ) were suggested as additional paths or relationships to improve the explanatory power. Lee (2017) first determined whether the paths made theoretical sense before recommending their addition to the model. Table 2.4 and Table 2.5 show the modification indices for beta and gamma, respectively, for the revised *psychological ownership* structural model.

Table 2.4

Reduced Psychological Ownership Structural Model Modification Indices for Beta (Model B)

	PO	MOT	SI	IK	C
PO	- -	14.115**	- -	- -	- -
MOT	- -	- -	70.924**	1.102	0.401
SI	278.955**	- -	- -	9.078**	24.928**
IK	- -	3.146	- -	- -	- -
C	- -	47.376**	- -	- -	- -

** (p<.01)

PO: psychological ownership; MOT: motivation; SI: self-investment; IK: intimate knowledge; C: control of the job

Note. Reprinted from *Development and empirical evaluation of an explanatory psychological ownership structural model by Lee, A.* Master's thesis. Stellenbosch: Stellenbosch University, p. 285.

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Table 2.5

Reduced Psychological Ownership Structural Model Modification Indices for Gamma (Model B)

	JC	PON	PS_MOT
PO	4.309	3.702	0.023
MOT	- -	- -	8.210**
SI	55.120**	0.306	- -
IK	7.169**	0.553	0.004
C	81.227**	1.727	0.260

** (p<.01)

JC: job characteristics, PON: psychological ownership needs and PS_MOT: the interaction between psychological safety and motivation to pursue the routes; PO: psychological ownership; MOT: motivation; SI: investing the self; IK: intimate knowledge; C: control of the job

Note. Reprinted from *Development and empirical evaluation of an explanatory psychological ownership structural model by Lee, A.* Master's thesis. Stellenbosch: Stellenbosch University, p. 286.

Lee (2017) thoroughly described why all of the suggested additional paths, besides one, did not make substantive theoretical sense. The proposed link that did make theoretical sense was between *psychological ownership* and *self-investment*. It was argued that individuals who experience and have feelings of ownership towards a target, will care for a target. This involves investing and reinvesting the self over time. However, contrary to Lee's (2017) argument that the hypothesised relationship should be positive, the completely standardised expected change results indicated that the relationship should be negative. Through a process of unbridled theorising, the following section modifies and elaborates on the first-generation *psychological ownership* structural model (Model B) that was proposed and empirically tested by Lee (2017).

2.3. MODIFICATION AND ELABORATION OF THE MODEL

Gordon, Kleiman and Hanie (1978) conveyed their concern about Industrial Psychology being a field characterised by short-lived interest and lack of commitment to a particular subject. These scholars claim that this results in severe intellectual disarray. Researchers seem to approach their work with a restless pioneering spirit, yet abandon it when the going gets tough or uninteresting. Gordon *et al*. (1978, p. 902) is concerned that Industrial Psychology is "a field of many frontiersmen, but few settlers." It is important to continue research focused on the construct of *psychological ownership*; building on or extending existing *psychological ownership* structural models. As argued earlier, a series of cumulative studies in which subsequent researchers build on the structural model findings of their predecessors, is the only way the discipline can approximate the full complexity of the psychological mechanism (i.e., the complex nomological network) underpinning the

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phenomenon of *psychological ownership*.

The question concerning how to modify and/or elaborate the reduced Lee (2017) *job-based psychological ownership* structural model (Model B) requires consideration of the following questions:

- Should all the latent variables currently included in the reduced Lee (2017) structural model be retained?
- Should all the current paths proposed by Lee (2017) in her reduced structural model be retained?
- Which additional latent variables should be added?
- How should the additional latent variables be structurally grafted onto the existing reduced Lee (2017) structural model?

Before addressing the latter posed questions, the conceptualisation of *job-based psychological ownership* (experienced at the individual level), as the focal construct or endogenous latent variable, should be attended to first. This will provide direction to theoretically justify retaining existing latent variables and path-specific hypotheses in the final (reduced) Lee (2017) model and to argue the need to include specific additional latent variables and paths.

The concept and feelings of ownership, as a psychological state, exists as a part of the human condition (Pierce *et al.,* 2003). *Psychological ownership* describes the "state in which individuals feel as though the target of ownership, is theirs (mine)" (Pierce *et al*., 2003, p. 68). Academics, for example, invest time, energy, and even their values and identity into their research, and consequently may feel strong ownership toward their jobs and the outcome of their scholarly pursuits (Pierce *et al.,* 2001). In organisational behaviour research, the construct of *psychological ownership* helps to comprehend how employees feel psychologically attached to, or how they relate to, their job (and organisation). Brown (1989, p. 15) argues that *psychological ownership* is "people working as if they own the place."

Adjusting and building on the constitutive definition proposed by Lee (2017), *psychological ownership* is a unidimensional, intrapersonal psychological state (affective, cognitive and conative), in which an employee develops an attachment to a target of ownership (job), through specific experiences/actions (routes) aimed at the satisfaction of specific human motives (roots).

At first glance, Lee's (2017) conceptualisation of *psychological ownership* as a

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unidimensional construct appears to be in direct conflict with the existing literature. Scholars such as Avey *et al.* (2009) and Pierce and Jussila (2010) have emphasised the "implied multidimensional nature" (Dawkins *et al.,* 2017, p. 169) of the construct, focusing on its dimensions of self-efficacy, self-identity, belongingness, stimulation, accountability, responsibility and territoriality. On the one hand, Lee's (2017) position on *psychological ownership* is therefore in conflict with those researchers that define *psychological ownership* as a multidimensional construct. On the other hand, Lee (2017) is in agreement with researchers that view latent variables such as self-efficacy, self-identity, belongingness, accountability, responsibility and territoriality as relevant to, yet distinct from *psychological ownership*. She argued that these related latent variables are either antecedents or consequences of *psychological ownership*. The current study agrees with the latter by assuming that these "sub-constructs" (Dawkins *et al.,* 2017, p. 165), namely *efficacy and effectance, self-identity* and *belongingness* are intertwined in the *roots of psychological ownership*, and relevant to the consequences of *psychological ownership.*

Psychological ownership consists of affective (emotional attachment), cognitive (intellectual perception) and conative (motivational influence) elements (Pierce *et al.,* 2001; 2003). At its conceptual core, *psychological ownership* is driven by the motivational source of possessiveness (Pierce *et al.,* 2001), be it promotive or preventative focused. For the purpose of this study, the focus is on *promotive psychological ownership*. Ozler, Yilmaz and Ozler (2008) proposed that feelings of possessiveness concern a cognitive and emotive attachment with a conative element. These scholars define *psychological ownership* as a cognitive and emotive attachment between a target and individual, which subsequently (conatively) influences the individual's conduct. Lee (2017) explained that this conative element motivates specific protective outcomes. In the current study, it is also interpreted as an outcome of *psychological ownership* that drives certain attitudinal and behavioural outcomes (Avey *et al*., 2009). In other words, when an employee experiences feelings of ownership, he/she will be motivated to pursue a certain action, for example, actions aimed at protecting the target of ownership and promoting its well-being.

2.3.1. Salient root needs and motivation to pursue the routes

Lee (2017) argued that the core psychological mechanism through which *psychological ownership* develops is the *motivation to pursue the routes to psychological ownership.* In other words, the level of motivation determines the extent to which the employee actually invests effort and energy in 'traveling' the routes. This in turn, determines the experience of *psychological ownership* that satisfies the *root needs of psychological ownership,* provided

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the target has the ability to satisfy these needs (e.g., the job has the job characteristics that can satisfy the root needs if an employee engages in the *routes to psychological ownership*). Lee (2017) based her theorising regarding the *motivation to pursue the routes to psychological ownership* on the expectancy theory (Vroom, 1964). As discussed earlier, the *motivation to pursue the routes* was grounded on the concept of valence, expectancy and instrumentality. The expectancy theory (Vroom, 1964) argues that the strength of the motivational force to perform some act (MF_{act}) is determined by the product of the subjective probability (i.e., expectancy; P) that effort (E) exerted in performing the act will be successful (P[E→Perf]) and the value attached (i.e., the valence VAL[Perf]) to successful performance of the act (Perf). The latter is in turn argued to be determined by the product of the subjective probability that successful performance of the act (Perf) will be instrumental in the attainment of specific rewards (R) (i.e., P[Perf→R]) and the valence of the rewards (VAL[R]). The valence of the reward depends on the extent to which the reward satisfies *salient root needs*. Expressed as an equation, the expectancy theory (Vroom, 1964) therefore argues:

$$MF_{act} = P[E \rightarrow Perf]*VAL[Perf]$$

$$= P[E \rightarrow Perf]*P[Perf \rightarrow R]*VAL[R]$$

When applied to the psychological mechanism that motivates pursuit of the *routes to psychological ownership,* Lee (2017) argued that psychologically 'traveling' the *routes to psychological ownership* (T_{routes}) by exerting effort in *investing the self*, gaining *intimate knowledge* and taking *control of the job* should be equated to performance [P] and *psychological ownership* should be equated to the rewards [R] that performance is instrumental in attaining. Lee (2017) argued that *psychological ownership* [PO] should be positively valenced if psychologically taking possession of one's job is perceived to satisfy the *psychological ownership root needs* due to the *characteristics of the job* and if the *psychological ownership root needs* are *salient*. Expressed as an equation, Lee (2017) therefore argued:

$$MF_{routes} = P[E \rightarrow T_{routes}]*VAL[T_{routes}]$$

$$= P[E \rightarrow T_{routes}]*P[T_{routes} \rightarrow PO]*VAL[PO]$$

The full complexity of the construct *motivation* was not captured in Lee's (2017) structural model. More specifically, the individual elements that influence levels of motivation and subsequent behaviour were simply collectively represented as *motivation to pursue*. The current study also formally acknowledges that the dynamic interplay may not have been captured in the operationalisation of the *motivation to pursue the routes to psychological*

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ownership, the *salient root needs*, as well as the concepts of expectancy and valence that underly motivation.

In the current study, the variable *motivation to pursue* the routes is conceptualised as the mediating variable[15] between the *salient root needs* (*efficacy and effectance, self-identity* and *belongingness*) and two of the *routes to psychological ownership* (*self-investment* and *control of the job*).

Salient root needs refer to the level of relevance (strength and importance) of the root need to the individual/employee. Referring back to original concept of *psychological ownership* and the need for possession, objects not only reflect an expression of the *self-identity* to other, but also provide continuity of the self over time. They also provide a person the ability to express their existence and anchor themselves in time, relationships and places. People are drawn to targets that fulfil their need to explore and manipulate nature (*efficacy and effectance*). Moreover, people have the need to feel at home, as if they belong and attach themselves to things that have provided them with meaningfulness (*belongingness*) (Pierce & Jussila, 2011). The fourth root need of *stimulation*, that was added by Pierce and Jussila (2011), refers to the idea that people become psychologically tied to targets that physically and cognitively allow them to become engaged. However, the current study agrees with Lee's (2017) conceptualisation that it can be interpreted as an individual's changing self-identity over time. In other words, as people interact with the environment, at different life stages, and in different contexts, they may build upon their own self-identity. Lee (2017, p. 42) argued that "these 'changes' in self-identity would therefore lead to connections to, or feelings of ownership for new objects, as expressions of the self." The stimulation that is produced by a target or object is not satisfying a need for stimulation but rather the satisfaction of the individual's need for *self-identity*. Nevertheless, in a model that presents the variable of "motivation", these roots and the pivotal role that they play cannot be left unacknowledged, as they describe the underlying motives and "why" this psychological state develops (Pierce & Jussila, 2011, p. 51).

Psychological ownership emerges because it "satisfies certain human motives, some genetic and other social in nature" (Pierce *et al*., 2001, p. 300). These roots (intra-individual forces) are human needs that, due to their *salience* (strength/importance), and through their desired satisfaction, motivate behaviour. *Psychological ownership* "not only has its roots in, but also serves to satisfy these three fundamental motives" (Brown *et al.,* 2014, p. 320). In

[15] The reference to 'mediating variable' does not imply that an indirect (mediation) effect will be explicitly tested for these relationships. The argument underlying these relationships will be discussed in the relevant path-specific section.

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other words, these are the latent conditions that become activated to varying degrees and at different times, as a person interacts with different targets (Pierce & Jussila, 2011). The drive to engage in the *routes*, is thus a function of the degree to which the target (job) is perceived to be able to satisfy these root needs and the extent to which the *root needs* are experienced as *salient.*

Psychological ownership cannot be experienced for an immaterial or material target, if the target does not allow for the activation and fulfilment of these intra-individual *psychological ownership* root forces (Olckers & Van Zyl, 2015). Even though these "motives only facilitate the development of *psychological ownership*, as opposed to directly causing it to occur" (Pierce *et al.,* 2003, p. 91), they are considered part of the "reason" and not the "cause" of *psychological ownership* (Pierce & Jussila, 2011). The emphasis and importance, therefore, still resides with the engagement of the *routes to psychological ownership*. Nevertheless, the current study would want to argue that the roots provide an understanding of why an employee would intend to or be motivated to 'travel' the routes to *psychological ownership*. Additionally, they also provide an understanding of why the actual psychological state of *psychological ownership* is experienced as rewarding. These root needs "serve us with an understanding of the individual's motives for feelings of ownership, or the functions that the sense of ownership serves to fulfil for the individual" (Pierce & Jussila, 2011, p. 49). Without the satisfaction of these needs, even if they only serve an instrumental or utilitarian function, an individual would not come to feel a sense of ownership over time. The following path-specific substantive research hypothesis is therefore postulated:

Hypothesis 2[16]: In the proposed psychological ownership structural model it is hypothesised that salient root needs positively influence motivation to pursue the routes to psychological ownership.

2.3.2. Job characteristics

Since the focus of this study is *job-based psychological ownership*, the target of ownership refers to the employee's job. The development of feelings of ownership is dependent on three aspects of the target. Firstly, the target should have the potential to satisfy the three *roots needs* of *psychological ownership*. Secondly, to allow satisfaction of the *root needs*, the target should have attributes such as openness, accessibility and manipulability. The target must also be attractive and visible to the individual, enabling it to be experienced by

[16] Hypothesis 1 refers to the overarching substantive hypothesis, namely that the structural model provides a valid account of the psychological mechanism underpinning levels of *psychological ownership* and the reciprocal relationship of performance outcomes creating additional variance in *psychological ownership*. The second substantive research hypothesis thus represents the first path-specific substantive research hypothesis.

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him/her. The last crucial aspect is that the target should facilitate the acts of the *routes to psychological ownership* (Pierce *et al.,* 2003).

Based on extensive theorising, Lee (2017) hypothesised that *job characteristics* (skill variety, task identity, task significance, autonomy and feedback) have the ability to satisfy the *root needs*. The potential of a job to satisfy the *root needs* therefore resides in the extent to which the job possesses the *job characteristics*. The notion continued that this satisfaction has to be anticipated to a certain degree, in order to motivate an individual to pursue the *routes to psychological ownership*. Lee (2017) hypothesised that *job characteristics* (perceived ability of the job characteristics to satisfy the salient needs) will have a positive influence on *motivation to pursue the routes to psychological ownership*. In the current study, the *job characteristics* variable refers to the five core job dimensions (skill variety, task identity, task significance, autonomy and feedback), the level of complexity of the job, and the perceived ability of the job to satisfy the salient root needs.

"Job characteristics are the pertinent attributes of the job that bring about the satisfaction of these needs and in turn motivate the routes" (Lee, 2017, p. 49). Also utilising this description, Brown *et al*. (2014) emphasised that through the arousal and satisfaction of the four motives, complex jobs are able to create conditions whereby, over time, if the opportunity offered by the job is psychologically embraced, employees experience *psychological ownership*. They provide a greater opportunity for personalisation and resultantly a reflection of the self. "Complex jobs, as opposed to simple routinized jobs, are more malleable and accessible, thus creating opportunities to satisfy the needs of effectance and control, dwelling and self-expression" (Brown *et al.,* 2014, p. 323). The current study would want to extend Lee's (2017) argument that the job characteristics affect the perceived ability of the job to satisfy the root needs via the routes. The current study would moreover want to argue that the perceived ability of the job to satisfy the root needs via the routes represents the $P[E \rightarrow T_{routes}]*P[T_{routes} \rightarrow PO]$ components of MF_{routes}[17]. This implies that the *salience of the root needs* and the *job characteristics* both affect *the motivation to pursue the routes,* but that they do so through different components of the motivation mechanism. The current study does not, however, explicitly test the hypothesised mechanism directly but rather indirectly by hypothesising that both the *salience of the root needs* and the *job characteristics*[18] affect *motivation to pursue the routes*. Consequently, the following path-specific substantive research hypothesis is postulated:

[17] This line of reasoning suggests that the salience of the root needs affect the VAL[PO] component of $MF_{routes.}$

[18] It is recommended that future studies consider dissecting *motivation to pursue the routes* into its hypothesised components and to explicitly test the foregoing line of reasoning.

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Hypothesis 3: In the proposed psychological ownership structural model it is hypothesised that job characteristics positively influence motivation to pursue the routes to psychological ownership.

The argument that the *salience of the root needs* and the *job characteristics* both affect the *motivation to pursue the routes to psychological ownership* (although through different components of the motivation mechanism) suggests that the interaction between the *salience of the root needs* and the *job characteristics* should affect the *motivation to pursue the routes* rather than the individual main effects. It was argued earlier that $MF_{routes} = P[E \rightarrow T_{routes}]*P[T_{routes} \rightarrow PO]*VAL[PO]$. Based on this line of reasoning, Hypotheses 2 and 3 would have to be retracted. The current study therefore decided to allow the two positions to empirically compete by testing the fit of a model that contains only the two main effects rather than a model that only contains the interaction effect[19].

The structural model modification indices for beta obtained by Lee (2017) indicated a potential path from *job characteristics* to *control of the job*. This seems to make theoretical sense, and this path will therefore be proposed in the current study. Over and above *psychological meaningfulness* experienced as a result of increased job complexity, Brown *et al*. (2014) postulated that increased complexity of a job may enhance feelings of possessiveness. This in turn, can lead to proactive behaviour aimed at enhancing, protecting and controlling the job, while bringing it into one's sphere of control. Complex jobs create a greater opportunity for employees "to exercise control, come to know the job intimately and invest themselves into the job," through which feelings of ownership emerge (Brown *et al.,* 2014, p. 324). Meaningful tasks that allow autonomy, for example, result in a sense of ownership (Hackman & Oldham, 1980). This is due to the fact that the autonomy enables employees a degree of control over their own work and job. The critical question to consider, however, is whether this influence should be direct, as suggested by the modification index, or whether its affect should be mediated by the *motivation to pursue the routes.* The current study would argue that a direct effect is warranted. As mentioned, the job design (i.e., the job characteristics) is a factor that either enables, or hinders the opportunity to exercise various levels of control over different aspects of the job. The following path-specific substantive research hypothesis is therefore postulated:

Hypothesis 4: In the proposed psychological ownership structural model it is hypothesised that job characteristics positively influence control of the job.

[19] All other paths kept the same across the two competing structural models.

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2.3.3. Psychological meaningfulness and psychological safety

According to Hackman and Oldham (1975, p. 162) experienced meaningfulness of work refers to the "degree to which the employee experiences the job as one which is generally meaningful, valuable and worthwhile." They claim that certain aspects of the job, such as task identity, task significance, autonomy and skill variety influence experienced *psychological meaningfulness*. As a critical psychological state that not only influences internal work motivation, but also shapes behaviour (Kahn, 1990), *psychological meaningfulness* could potentially find traction as a psychological state that indirectly influences *psychological ownership*.

Kahn (1990, pp. 703-704) described *psychological meaningfulness* as "a feeling that one is receiving a return on investments of one's self in a currency of physical, cognitive or emotional energy." It is considered one of the three psychological states (meaningfulness, safety and availability) that influence personal engagement in work roles. Personal engagement, in its core, has roots in being attached to various roles. It can be seen as the extent to which employees express themselves emotionally, cognitively and physically during role performance (Kahn, 1990). Personal engagement thus seems conceptually similar to the *self-investment* route of *psychological ownership*, as the investment of one's time, effort, energy and attention into objects "causes the self to become one with the object and to develop feelings of ownership towards that object" (Pierce *et al.,* 2001, p. 302). This feeling of ownership has also been conceptualised as being psychologically "attached" to a particular target (Dawkins *et al.,* 2017, p. 163).

Individuals with higher levels of *psychological meaningfuln*ess tend to display higher levels of personal engagement (Kahn, 1990). Three factors generally influence *psychological meaningfulness,* namely *role characteristics, task characteristics* and *work interactions* (Kahn, 1990). It can be proposed that these influences are somewhat similar to the *job characteristics* that allow for the satisfaction of the *root needs* of *psychological ownership*. In organisations, certain identities are tied to different roles that employees are required to assume (Kahn, 1990). Depending on the extent to which a role fits with a person's identity, the root need of *self-identity* would be satisfied. Kahn (1990) suggested that when an employee experiences a greater congruence between their self-concept and their subjective interpretation of the requirements of the role, they will invest greater personal effort to achieve not only individual, but also organisational goals. Since people generally feel powerless (Lasch, 1984), people search for ways to feel important and valuable (Kahn, 1990). Related to the *root need* of *efficacy and effectance*, different roles enable a person

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to shape the external world and experience a sense of meaningfulness (Kahn, 1990), power and control. Lastly, in terms of work interactions, the extent to which an employee has meaningful connections and interactions at work helps to develop an emotional bond. This promotes a sense of dignity, self-appreciation and feeling valuable and valued (Kahn, 1990). It could be proposed that this is linked to the *root need* of *belonging* in the sense that the employee feels that the environment and co-workers create a feeling of 'home', where they belong. According to Porteous (1976), people are likely to experience feelings of ownership over possessions in which a considerable emotional investment has been made (i.e., in a place in which "meaningfulness" has been found as individuals anchor themselves in time and space) (Brown *et al.,* 2014, p. 320).

In addition to the construct of *psychological safety*, as proposed by Lee (2017), *psychological meaningfulness* makes theoretical sense in this context. This is based on the fact that it stems from role characteristics, task characteristics and social interactions (aspects in the individual's work environment and job characteristics) and links to the arousal and/or satisfaction of the *root needs*. Therefore, the following path-specific substantive research hypothesis is postulated:

Hypothesis 5: In the proposed psychological ownership structural model it is hypothesised that the extent to which an employee experiences psychological meaningfulness will positively influence motivation to pursue the routes to psychological ownership.

Kahn (1990, p. 708) defines *psychological safety* as the employee's "sense of being able to show and employ one's self without fear of negative consequences to self-image, status, or career." Even though *psychological safety* is mostly influenced by interpersonal relationships, groups, intergroup dynamics, management style and processes, and organisational norms (Kahn, 1990), the focus in this context, is on the construct's outcomes and not its determinants. Kahn (1990, p. 700) suggests that employees become involved in their jobs (roles) "in ways that display what they think and feel, their creativity, their beliefs and values." Employees that engage in this *self-investment* process experience a certain degree of vulnerability. *Investing the self* and taking *control of the job* is a potentially risky transaction in which a person is making oneself vulnerable, by psychologically committing to the act of psychologically 'buying' the job. This could potentially increase the risk of negative consequences, such as an employee not fully revealing the self within the job (Lee, 2017) or living up to his/her full potential.

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Kahn (1990) indicated that experienced levels of *psychological safety* positively influence employee engagement (which includes aspects of *self-investment*, as mentioned). Moreover, employees that experience *psychological safety* should be more willing to take the risk of self-expression within their job, without fear of negatively impacting their status, career or self-image (Lee, 2017). Lee (2017) therefore argued that if an employee experiences *psychological safety* in the job, then he/she would be *motivated to pursue the routes to psychological ownership* (and ultimately the routes of *self-investment* and *control of the job*). In other words, *psychological safety* acts as a precondition to act on a high *motivation to pursue the routes to psychological ownership*.

Lee (2017) therefore hypothesised that perceived *psychological safety* could moderate the effect of *motivation to pursue the routes* on the extent to which the employee *invests the self* into the job. In terms of her reasoning, high *motivation to pursue the routes* will only result in *investing the self,* provided it is perceived as safe to do so. However, support was not found for this hypothesised interaction effect. In her reflection on possible future modifications of the model, Lee (2017, pp. 321-322) argued as follow:

> The initial interaction argument assumed that the psychological safety appraisal was stimulated only once the motivation to pursue the routes had been formed, without actually influencing the motivation to pursue the routes. It, however, would seem more reasonable to suggest that an employee who feels psychologically safe (or has evaluated a situation or context as psychologically safe within his or her work environment/job) will experience maximal strength expectancies. It could be considered as a latent variable influencing the valence of the salient outcomes within the equation for motivation. Appraising the act of psychologically "purchasing the job" as psychologically unsafe implies that negatively valenced outcomes are anticipated with non-zero probabilities, if the routes to psychological ownership would be pursued. It is therefore hypothesised that psychological safety would influence the action-outcome associations that employees experience, which would then negatively (or positively) influence the level of motivation experienced to pursue the routes. Psychological safety could therefore possibly influence, or form part of, the evaluation process (how an individual evaluates the outcome of pursuing the routes to psychological ownership) that influences the motivational process.

The current study agrees with Lee's (2017) revised reasoning on the impact of *psychological safety* on *self-investment*. It seems more reasonable that *psychological safety* exerts an indirect effect on *self-investment* via its effect on *motivation to pursue the routes.* In other words, *motivation to pursue the routes* mediates the relationship between *psychological safety* and *self-investment.* It could be argued that the effect of *psychological safety* on *motivation to pursue the routes* operates primarily through the expectancies associated with

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negatively valenced outcomes. Negatively valenced outcomes are unattractive, undesirable outcomes that one would not want to occur. The reference to negatively valenced outcomes implies that feelings of *psychological safety* should be high if the expectancy that negative events/outcomes will occur when traveling the *routes to psychological ownership* is small or low. The following path-specific substantive research hypothesis is consequently postulated:

Hypothesis 6: In the proposed psychological ownership structural model it is hypothesised that the extent to which an employee experiences psychological safety will positively influence motivation to pursue the routes to psychological ownership.

2.3.4. Routes to psychological ownership

The routes (paths or mechanisms) are known as the direct antecedents to, and determinants of *psychological ownership* (Pierce & Jussila, 2011). These include *investing the self* into the target*, intimately coming to know* the target and *controlling* the target (Pierce *et al.,* 2001; 2003). The following hypotheses concerning the routes to psychological ownership are based on Lee's (2017) theorising and descriptions. An even more in-depth discussion concerning the *routes* can be found in Lee (2017). Even though the *roots to psychological ownership* are not seen as an end in-and-of themselves (Pierce & Jussila, 2011), when the *routes* are perceived to be instrumental in the satisfaction of the underlying *psychological ownership root needs* (motives), through the experience of *psychological ownership*, an individual will be *motivated to pursue the routes to psychological ownership.* In other words, through the activation and desired satisfaction of these underlying motives, an employee is *motivated to pursue the routes*.

According to Pierce *et al*. (2001) there are many forms in which *investment of the self* can occur, for example by investing one's skills, ideas, time, psychological, intellectual and physical energies. It is through this investment that an individual may begin to experience feelings of ownership. The more an employee invests themselves into their job, the stronger *the psychological ownership* towards that job will be (provided the job has the ability to satisfy the *root needs*). Investment of the self into objects causes the self to become one with the object. This can be attributed to the fact that the object becomes a haven for the self and assists in defining it (Csikszentmihalyi & Rochberg-Halton, 1981). Two of the fundamental *root needs* are considered to be the main driving force behind the *motivation to pursue the route* of *self-investment* (Brown *et al.,* 2014). These include the *self-identity root need* (Dittmar, 1992; Porteous, 1976), "as the object becomes an expression of the self" (Brown *et al.,* 2014, p. 328) and the need for a *place to dwell* (*sense of belonging*)

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(Heidegger, 2010), as the employee "inhabits the target of their self-investment" (Brown *et al.,* 2014, p. 328). The following path-specific substantive research hypothesis is therefore postulated:

Hypothesis 7: In the proposed psychological ownership structural model it is hypothesised that motivation to pursue the routes positively influences the extent to which an employee invests himself or herself into the job.

Relative to identification, experienced feelings of *control* are one of the key distinguishing features of *psychological ownership* (Brown *et al.,* 2014). Ownership involves an individual bringing an object within his/her sphere of control; making something external, internal (Belk, 1988; Dittmar, 1992; Furby, 1978), and becoming psychologically tied to an object as it becomes part of the extended self (Beaglehole, 1932; Belk, 1988). Job design is a crucial aspect as it either facilitates or hinders the ability to take control of the job (Hackman & Oldham, 1980). Therefore, the extent to which the job provides the employee the opportunity to take control plays a pivotal role.

Lee (2017) hypothesised that *self-investment* as a *route to psychological ownership*, acts as a mediator between the *motivation to pursue the routes* and *control of the job*, as well as between *motivation to pursue the routes* and gaining *intimate knowledge*. However, the modification indices for beta indicated a potential path from *motivation to pursue* directly to *control of the job*. Although Lee (2017) contended that this path does not make theoretical sense, the current study would want to argue that it does.

Due to the fact that the *root needs* constitute a critical component of the motivation variable as it has been conceptualised (through their activation and desired satisfaction they motivate behaviour), the need for *efficacy and effectance* plays a pivotal role. In their environmental interactions, individuals are motivated to experience themselves as efficacious and competent, which consequently leads to the desire to control their environment in ways that satisfy this underlying motive (White, 1959). In other words, *job characteristics* that allow for the satisfaction of the employee's need for *efficacy and effectance,* should motivate an employee to take *control of the job*.

The role of the *roots of psychological ownership* in conjunction with the *job characteristics* should not be underestimated. They may create "strong motivational drives to perform well in order to demonstrate an increased sense of control and efficacy over the job" to ultimately increase one's esteem or self-identity, or secure one's place in a company, where one feels valued and comfortable (Brown *et al.,* 2014, p. 324). The following path-specific substantive research hypothesis is consequently postulated:

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Hypothesis 8: In the proposed psychological ownership structural model it is hypothesised that motivation to pursue the routes positively influences control of the job.

As discussed in Lee (2017), Isaacs (1933) described feelings of ownership via children's interaction with nursery rhymes and how they took ownership of the ones they had heard first. Through the *self-investment* of listening to, and learning the nursery rhyme, the child takes *control* of it and makes it their own. Similarly, within the working environment context, a job constitutes an extension of an employee's self, through his/her *investment of the self* (as a form of self-expression) and through his/her resultant *control* over the job.

Lee (2017) suggested that an employee may be motivated to take the risky psychological step of *investing the self* into the target by committing and giving the self to the target, if the employee experiences feelings of *psychological safety*. This in turn, may lead the individual to take *control*. *Investing the self* into the job is thus a prerequisite that allows the individual to take steps to take *control of the job.* Therefore, the path-specific substantive research hypothesis proposde by Lee (2017) will be postulated again:

Hypothesis 9: In the proposed psychological ownership structural model it is hypothesised that self-investment positively influences control of the job.

Coming to intimately know the target relates to the aspects of information, time and intensity of association. The more knowledge and information an individual obtains about a target, the stronger the feelings of ownership (Pierce *et al.,* 2001). Through the association (Sartre, 1969) and a living relationship with objects, individuals develop feelings of ownership towards a target (James, 1890). The intensity of association (number of interactions with the target) also needs to be considered, as information alone may not be sufficient to create feelings of ownership (Pierce *et al.,* 2001).

The relationship that exists between the amount of *control* a person has over a target, and the resultant experience of that target being a part of the self, is highly positive (Furby, 1976). In other words, the more *control* an individual (employee) has over a target (job), the more the target will be experienced as an extension of the self. It is through this active association (Lee, 2017), and living relationship with objects or "law of mental association by contiguity" (James, 1890, p. 561) that individuals come to know them increasingly well. It thus seems reasonable to argue that the higher levels of *control* an employee experiences within a job, the more *intimate knowledge* he/she could gain regarding aspects of the job (Lee, 2017).

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Lee (2017) originally proposed a positive reciprocal relationship (reciprocal causation) between *self-investment* and *intimate knowledge*. She suggested that the target's attractiveness and ability to act as an extension of the self, could motivate an employee to invest energy and time getting to know the target intimately, in order to experience a sense of ownership. By gaining *intimate knowledge* and *investing oneself* into the target, an employee thereby gains even deeper knowledge and insight about the target, and resultantly becomes even more "deeply engrained into the target" (Lee, 2017, p. 75).

However, when fitting the structural model, an inadmissible value obtained lead to the removal of the path from *intimate knowledge* to *self-investment*. In the current study, this relationship will be proposed again as it makes theoretical sense. Based on the latter discussion, the following path-specific substantive research hypotheses are postulated:

Hypothesis 10: In the proposed psychological ownership structural model it is hypothesised that the degree of control of the job positively influences the extent to which an employee gains intimate knowledge of the job.

Hypothesis 11: In the proposed psychological ownership structural model it is hypothesised that self-investment positively influences the extent to which an employee gains intimate knowledge of the job.

Hypothesis 12: In the proposed psychological ownership structural model it is hypothesised that the extent to which an employee gains intimate knowledge will positively influence self-investment.

As mentioned, the *routes to psychological ownership* are the 'paths' down which people travel, or the actions[20] that people take (and resultant experiences) with regards to a target that give rise to feelings of ownership (Brown *et al.,* 2014; Pierce *et al.,* 2001; 2003). In order to avoid redundant explanations, exactly how each *route* leads to *psychological ownership* will only briefly be described as the theorising behind the following three hypotheses has been integrated in the entire section thus far.

The more an individual *invests the self* into the target, the more he/she will experience feelings of ownership and resultant *psychological ownership* towards the target (Pierce *et al.,* 2001). It therefore seems permissible to suggest that in the world of work, after investing

[20] Although the *routes* were explicitly conceptualised as experiences in the current study, as well as in Lee's (2017) study, the routes can also be understood as actual behaviours that individuals engage in with regards to a target (e.g., job). In other words, cognitively, emotionally or physically *investing the self* into the job, taking *control of the job* and gaining *intimate knowledge* about the job.

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one's self, one's energy, time and thought into the job, an employee may experience the job as an extension of the self and feel a sense of ownership towards it (Lee, 2017).

Control is considered a key characteristic associated with *psychological ownership* (Pierce *et al.,* 2001), since control exercised over an object ultimately leads to feelings of ownership emerging (Csikszentmihalyi & Rochberg-Halton, 1981). Ellwood (1927) suggests that the ability to use, and to *control* the use of an object/target, defines ownership. This feeling of control over a target of ownership enables an individual to experience the responsibilities and rights associated with the relationship of ownership between the individual and the target object (Pierce *et al.,* 2001). Furthermore, the greater the *control*, the greater the feelings of the object being an extension of the self (Ellwood, 1927) and consequently, the greater the feelings of *psychological ownership*.

According to Beaglehole (1932), by knowing an object passionately and intimately, it becomes part of the self. Moreover, this *intimate knowledge* of the target of ownership breeds familiarity, which contributes to the anchoring of oneself in space and time, while ultimately satisfying the *need for a place (belonging)*. Pierce et al. (2001, p. 301) suggest that "the more information and the better the knowledge an individual has about an object, the deeper the relationship between the self and the object and, hence, the stronger the feelings of ownership toward it." As mentioned, it is through this living relationship with the target of ownership, and the process of coming to intimately know it (James, 1890), that *psychological ownership* emerges. The following path-specific substantive research hypotheses are consequently postulated:

Hypothesis 13: In the proposed psychological ownership structural model it is hypothesised that self-investment has a positive influence on job-based psychological ownership.

Hypothesis 14: In the proposed psychological ownership structural model it is hypothesised that the extent to which intimate knowledge of the job is gained has a positive influence on job-based psychological ownership.

Hypothesis 15: In the proposed psychological ownership structural model it is hypothesised that control of the job has a positive influence on job-based psychological ownership.

2.3.5. Motivational effects of psychological ownership

Lee (2017, p. 77) examined the motivational effects of *psychological ownership* and stated the following:

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> Should an employee experience satisfaction of the need for self-identity, the need to belong or have a home and/or the need to control the job, and in turn after being motivated to follow the routes to *psychological ownership* therefore experience feelings of ownership, or an attachment to the job, it is hypothesised that the employee could then in turn be motivated to expend more time and energy (physically and psychologically) on the job.

Referring back to original conceptualisation of the construct, Pierce *et al*. (2001; 2003) affirm that *psychological ownership* has its roots in, and serves to satisfy the three fundamental human motives. It therefore seems reasonable to include a hypothesis concerning this motivational effect of *psychological ownership*. Lee (2017), however, found this hypothesised feedback path from *psychological ownership* to *motivation to pursue the routes* to be statistically insignificant (p>.05). This raises the following question: Should the feedback effect of *psychological ownership* not influence the *salience* of the *psychological ownership root needs* instead, and thus only indirectly the *motivation to pursue the routes to psychological ownership?*

If this line of reasoning is accepted, the question then arises: Should the feedback effect be positive or negative? Does satisfaction of the root needs through the experience of *psychological ownership* deepen the desire for the satisfaction of these needs (i.e., increase the salience of the root needs)? The more one experiences it, the deeper the need for it becomes? Or does the opposite hold, that once the need is satisfied, the need abates, or at least temporarily? The current study argues that since the *root needs* are not low-level needs, like the need for food or physiological safety, the former scenario more likely would apply. The following path-specific substantive research hypothesis is consequently postulated:

Hypothesis 16: In the proposed psychological ownership structural model it is hypothesised that job-based psychological ownership positively influences an employee's salient root needs.

Based on the modification indices for beta, Lee (2017) considered including a path from *psychological ownership* to *self-investment*. The modification index (i.e., expected change) results indicated that the path coefficient associated with such a path would be negative. Lee (2017) concluded that such a negative relationship did not make substantive theoretical sense and therefore refrained from proposing the addition of this path. The current study would want to argue that Lee (2017) was too quick to dismiss the proposed negative path as theoretically illogical. When considering the statistical significance and signs of hypothesised and estimated path coefficients, and the (standardised) expected change

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associated with proposed additional paths, it should be kept in mind that γ_{ij} and β_{ij} should be interpreted as partial regression coefficients. The path coefficients therefore indicate the effect of ξ_j on η_i and the effect of η_j on η_i when statistically controlling all other effects in the model linked to η_i. The expected change obtained by Lee (2017) therefore indicated that *psychological ownership* will negatively influence that part of *self-investment* that is not explained by *motivation to pursue the routes*[21]. Stated differently, the (standardised) expected change seems to suggest that the experience *of psychological ownership* will diminish the role that non-motivational factors play in *investing the self*. It is acknowledged that the argument definitely would be strengthened if the identity of the excluded sources of variance in *self-investment* (currently represented under structural error variance) would have been known. One possible alternative systematic source of self-investment could possibly be a *Calvinistic work ethic*. One could argue that employees (initially) invest themselves in their jobs not necessarily because they want to but because they feel they have to. In the current study the data-driven suggestion made by LISREL will therefore be accepted, a (feedback) path from *psychological ownership* to *self-investment* will be hypothesised and this relationship will be proposed as negative.

On the other hand, it can also be argued that when an individual experiences feelings of ownership, it is accompanied by a feeling of accountability and responsibility towards the target (Pierce *et al.,* 2001). These feelings of responsibility and accountability include a responsibility to invest energy and time to advance the cause of the target (Pierce *et al.,* 2001). Since possessions are considered extensions of the self (Belk, 1988), it can be assumed that when the employee's self is closely linked to the target it consequently increases the desire to protect, maintain and enhance that identity (Pierce *et al.,* 2001). Therefore, *psychological ownership* induces employee's feelings of responsibility towards their job, that not only encourages them to maintain their self-identity motive, but also increase their level of *self-investment* into the job. Earlier it was argued, however, that the feedback effect of *psychological ownership* should be hypothesised to influence the *salient root needs* directly, while only indirectly influencing the *motivation to pursue the routes* and consequently, positively indirectly influencing *self-investment.* The following path-specific substantive research hypothesis is consequently postulated:

[21] In Lee's (2017) reduced model *motivation to pursue the routes* was the only statistically significant ($p<.05$) determinant of *self-investment*. The *psychological safety x motivation* interaction effect was statistically insignificant ($p>.05$) and hence ignored in the current argument.

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Hypothesis 17: In the proposed psychological ownership structural model it is hypothesised that job-based psychological ownership negatively influences self-investment (when controlling for motivation to pursue the routes).

2.3.6. Outcomes of psychological ownership

A substantive amount of literature has investigated the various workplace outcomes, individual level outcomes (such as emotional, attitudinal, motivational and behavioural outcomes), as well as the mediating relationship of *psychological ownership*. Some of the favourable outcomes of *job-based* and *organisation-based psychological ownership* include organisational commitment (specifically affective commitment), job satisfaction, organisation-based self-esteem, work engagement, intention to stay and OCB (Liu *et al.,* 2012; Mayhew *et al.,* 2007; Ramos *et al.,* 2014; Sieger *et al.,* 2011; Van Dyne & Pierce, 2004; Zhu *et al.,* 2013). Other outcomes include knowledge sharing/withholding and *psychological ownership's* negative relationship with burnout under specific conditions (Kaur *et al.,* 2013; Peng & Pierce, 2015).

Although *job-based psychological ownership* has been empirically shown to be correlationally related to these outcomes, the exact manner in which these outcomes (directly and/or indirectly) structurally relate to each other, and how *psychological ownership* (directly and/or indirectly) structurally relate to these outcomes, have not been established. Moreover, limited research has investigated how *job-based psychological ownership* (directly and/or indirectly) structurally relates to *job performance* (Brown *et al.,* 2014; Mayhew *et al*., 2007; Van Dyne & Pierce, 2004). The studies that have investigated this relationship also mostly provided mixed results. For example, Mayhew *et al*. (2007) found an insignificant relationship between *job performance* and both *job-based* and *organisation-based psychological ownership*. Brown *et al*. (2014), on the other hand, found a strong relationship between sales performance and *job-based psychological ownership.*

The current study contends that *job performance* is a pivotal latent variable that deserves a place in a *psychological ownership* structural model. To validly understand the nature of the psychological mechanism that describes the manner in which the aforementioned outcomes (directly and/or indirectly) structurally relate to each other, and the manner in which *psychological ownership* (directly and/or indirectly) structurally relate to these outcomes, *job performance* will have to be considered and included in the structural model.

As mentioned in Lee (2017), Druskat and Kubzansky claim that *psychological ownership* is at the core of enhacing employee empowerment and performance. "When ownership sentiments arise, the worker's relationship to the employing organization is transformed,

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and participation in, commitment to, empowerment by, and responsibility for that organization may be seen as increasingly probable outcomes" (Druskat & Kubzansky, 1995, p. 5). Performance is the result of the lawful working of a complex nomological network of latent variables characterising the individual and his/her work environment (Myburgh, 2013). The concern is that very few studies have attempted to unravel exactly how *psychological ownership* contributes to performance.

Van Dyn and Pierce (2004) demonstrated the positive influence of *organisation-based psychological ownership* on the overarching construct of *job performance*, focusing on relationships with others, the quantity and quality of work, reliability and initiative (Van Dyn & Pierce, 2004). However, the influence of *psychological ownership* on the different dimensions of performance was not reported. Brown *et al*. (2014) utilised sales performance to test the effect of *job-based psychological ownership* on *job performance*. The relationship between *job-based psychological ownership* and performance is generally described on an abstract level, with the endogenous variable being in-role behaviour, or employee job performance, yet the dimensions of performance that *job-based psychological ownership* influences are rarely discussed. There seems to be potential for future research to determine exactly how *job-based psychological ownership* influences *job performance*. A further question that should be considered is whether performance feeds back onto *psychological ownership*? Somehow it seems unlikely that one's emotional attachment to, and self-identification with a job will remain unaffected if one consistently fails to achieve at least a reasonably acceptable level of performance.

2.3.7. Employee creativity and entrepreneurial behaviour

With the ultimate goal of enhancing organisational performance, two desirable employee behaviours will be investigated, namely *creativity* and *individual-level entrepreneurial behaviour*. Creativity is considered to be a desirable behaviour because employees who feel competent to engage in creative behaviours, solve problems creatively and generate creative ideas (Cohen-Meitar, Carmeli & Waldman, 2009). Creativity is a very complex phenomenon as it combines cognitions, affect, personality traits and environmental influences (Ward, 2004). It is defined as ''the production of novel and useful ideas by an individual'' (Amabile, 1988, p. 126) and is linked to the concept of organisational innovation (Cohen-Meitar *et al.,* 2009). Cohen-Meitar *et al*. (2009) reported that individuals who experience organisation-based self-esteem, organisational identification, and positive psychological experiences tend to display enhanced *employee creativity*.

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It could be argued that *psychological ownership* could also be associated with *employee creativity*. The fact that Van Dyn and Pierce (2004) included 'initiative' as a dimension of job performance indicates that there are potential links between innovative and creative behaviour to feelings of ownership. Furthermore, *psychological ownership* has also been empirically linked to organisation-based self-esteem (Liu *et al.,* 2012; Van Dyn & Pierce, 2004).

Organisational identification refers to ''the perception of oneness with, or belongingness to an organization, where the individual defines him or herself in terms of the organization(s) in which he or she is a member'' (Mael & Ashforth, 1992, p. 104). According to Pierce *et al*. (2001, p. 305) organisational identification is conceptually distinct from *psychological ownership* as it refers to the "social classification or categorization of the self in terms of what one believes are distinctive and admired attributes of the organisation." Identification is anchored in social identity theory and refers to "the use of the organization's characteristics to define oneself" (Pierce *et al.,* 2001, p. 305). However, *psychological ownership* and organisational identification share reference to self-identity and the self (Pierce *et al.,* 2001). Since the main focus of the current study is *job-based psychological ownership*, it can be assumed that the extent to which an employee associates their self-concept with their particular job and role characteristics reflects this notion. *Psychological ownership*, as a psychological state, is rooted even deeper in an employee. This is based on the fact that it not only refers the "what do I feel is mine" question, but also includes the "who am I" question of organisational identification (Pierce *et al.,* 2001, p. 305), which relates to the roots of *self-identity* and *belongingness*.

Along the same lines, Cohen-Meitar *et al*. (2009) reported that employees who experience meaningfulness (in and at work) are more likely to identify with the organisation. In the current study, it is hypothesised that *psychological meaningfulness* positively influences the *motivation to pursue the routes to psychological ownership*. By including *psychological meaningfulness* early on in the development of *psychological ownership*, it could be argued that it may eventually, indirectly, enhance employee creative behaviour.

In terms of positive psychological experiences, Fredrickson (2001) suggested that when a person enjoys positive experiences, it is more likely that he/she will display favourable behavioural outcomes, such as creativity. It has been empirically verified that *psychological ownership* is likely to result in a positive or pleasurable emotional job-related state (Pierce & Jussila, 2011) as well as "positive evaluative judgments of the job and job situation" (Jussila, Tarkiainen, Sarstedt & Hair, 2015, p. 130; Weiss & Cropanzano, 1996). Based on

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the argument thus far, it is proposed that *psychological ownership* may lead to *employee creativity*.

Individual-level *entrepreneurial behaviour* refers to the actions taken by employees that relate to the exploitation and discovery of entrepreneurial opportunities and ideas (Hornsby, Kuratko, Shepherd & Bott, 2009; Shane & Venkataraman, 2000). Individual-level *entrepreneurial behaviour* has been empirically linked to corporate entrepreneurship and resultant firm performance (Zahra, Jennings & Kuratko, 1999).

Building on the agency theory, Sieger, Zellweger and Aquino (2013) demonstrated that employees with strong ownership feelings are more likely to exhibit principal-like behaviour. In other words, they verified "the claim that psychological ownership turns agents into psychological principals" (p. 379). The agency theory refers to the relationship between the manager (agent) and the shareholder (principal), where "the principal(s) engage another person (the agent) to perform some service on their behalf, which involves delegating some decision-making authority to the agent" (Jensen & Meckling, 1976, p. 5). They also demonstrated that *organisation-based psychological ownership* is directly linked to individual-level entrepreneurial performance. This finding holds a lot of potential because it means that agents (managers), with *psychological ownership* are more likely to engage in *entrepreneurial behaviour*, while keeping the best interest of the principal and organisation in mind.

Even though the aforementioned study and its findings were based on *organisation-based psychological ownership*, it could potentially relate to *job-based psychological ownership* as well. If an employee's job forms an integral part of him/herself (identity), the employee will strive to enhance and maintain that identity (Pierce *et al.,* 2001) and the employee will be motivated to perform successfully. According to Van Dyne and Pierce (2004), feelings of ownership is linked to feelings of empowerment. Empowered individuals believe they have an impact and are autonomous (Sieger *et al.,* 2013). Consequently, it increases the likelihood that these individuals will be innovative, creative, and expect success (Amabile, 1988; Redmond, Mumford & Teach, 1993; Sieger *et al.,* 2013). According to Sieger *et al*. (2013) if empowerment is linked to innovativeness, change stimulation and creativity, then there should be a link between *psychological ownership* and individual level *entrepreneurial behaviour*. In the current study, this *psychological ownership* thus refers to *job-based psychological ownership*. Furthermore, referring to the root of *efficacy and effectance*, and the route of *control of the job,* employees will be motivated to exercise and demonstrate *control*, explore entrepreneurial opportunities and generate new ideas (Sieger *et al.,* 2013).

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Due to the increased sense of responsibility (as an corollary outcome of *psychological ownership*) employees will moreover be motivated to invest energy and time, while assuming personal risk (Pierce *et al.,* 2001).

The ideal would be to have employees that generate creative ideas, explore and exploit possibilities and opportunities, and develop strategies, while taking responsibility for their actions. Even though these behaviours are not directly related to the execution of an employee's job (task) duties (Pierce & Jussila, 2011), they are still favourable employee behaviours that contribute to successful employee and organisational performance. These behaviours are especially beneficial for the dynamic South African world of work. The following path-specific substantive research hypothesis is thus postulated:

Hypothesis 18: In the proposed psychological ownership structural model it is hypothesised that job-based psychological ownership positively influences employee creativity and entrepreneurial behaviour.

2.3.8. Global performance

In 2008 Saville Consulting undertook Project Epsom, in which the most popular personality questionnaires were compared to determine which of them provide the most valid predictor of work performance. During this project a global performance measure (Performance 360) was developed to ensure that the various personality measures were being compared fairly. It was specifically designed to measure work performance and provides objective performance criteria against which the different personality questionnaires were compared. It consists of behavioural, ability and global areas of work performance (Saville, MacIver, Kurz & Hopton, 2008). Independent raters were asked to evaluate employees on how effective they were on the various aspects in order to determine their effectiveness in their job (Saville *et al.,* 2008).

For the current study, the focus is on the global areas of performance. The assessment includes three sections that break down into nine dimensions. The three global performance areas include *accomplishing objectives, applying specialist expertise* and *demonstrating potential* (Saville, MacIver, Kurz & Chan, 2013). *Accomplishing objectives* includes the following performance dimensions, namely *achieving personal targets, contributing to team objectives* and *furthering organisational goals*. *Applying specialist expertise* includes *utilising expert knowledge, applying specialist skills* and *sharing expertise*. *Demonstrating potential* refers to *seeking career progression, demonstrating capabilities required for high level roles* and *showing potential for promotion* (Saville *et al.,* 2013). In an attempt to determine exactly how *psychological ownership* structurally relates to job performance, two

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of the three global performance dimensions are of particular interest, namely *accomplishing objectives* and *applying specialist expertise*. These two dimensions will therefore be used to evaluate how *psychological ownership* may influence employees' performance.

2.3.9. Accomplishing objectives

According to Saville *et al*. (2013) *accomplishing objectives* is at the heart of performance. As mentioned, this aspect of work performance refers to *achieving personal targets, contributing to team objectives* and *furthering organisational goals.* Promotive psychological ownership, grounded on regulatory focus theory (Higgins, 1997; 1998) concerns values of openness to change and willingness to take risks (Avey *et al.,* 2009). Regulatory focus theory suggests that individuals have two different self-regulatory systems that determine how they set goals for themselves. Thus, a promotive self-regulation system concerns accomplishment and aspirations (Dawkins *et al.,* 2017). As mentioned previously, *promotive psychological ownership* concerns a greater sense of belonging to a target, feeling a sense of personal identification with the target, feeling efficacious about working with the target and feeling accountable for what happens to the target (Avey e*t al.,* 2012). Based on this, it can be assumed that individuals who experience *promotive job-based psychological ownership* will strive to set and *achieve personal targets* (through increased *self-investment*).

Across studies, positive correlations have been reported between *job-based* and *organisation-based psychological ownership.* According to Pierce and Peng (2015), *job-based psychological ownership* underpins feelings of *organisation-based psychological ownership* developing. The key aspect and prerequisite, however, is that an employee must experience *control* over the job in order for this to occur. Therefore, assuming that the individual has the opportunity to take *control of the job* and feelings of ownership were to emerge over time towards the job, these feelings of ownership are likely to spill over and transfer to the organisation at large. This "job-work relationship" can be explained by means of the cognition theory's "relational" and "attitude generalization" perspective (Pierce & Peng, 2015, p. 153; Sluss and Ashforth, 2008). According to Sluss and Ashforth (2008), when two referents are paired with, or related to one another, attitude generalisation between the two referents commonly occurs (Banse, 1999). In other words, in the minds of most organisational members, the work performed, the job held by the individual, and the organisation in which the job/work is embedded, are two referents that are routinely paired with one another. Pierce and Peng's (2015) findings therefore claim that feelings of ownership towards the job transfer to feelings of ownership towards the organisation, which

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means that the resultant sense of responsibility and accountability (Avey *et al.,* 2009) towards the target (job), should also be felt towards the organisation in which the job is embedded.

According to Avey *et al*. (2009), when an individual feels ownership towards an organisation, they tend to engage in positive behaviour, which is driven by the sense of responsibility accompanying these ownership feelings. A substantive amount of literature (e.g., Ramos *et al.,* 2014; Van Dyne & Pierce, 2004; Zhu *et al*., 2013) has demonstrated the link between *psychological ownership* and OCB. OCB or extra-role behaviour concerns employees going beyond what is required of them in their job descriptions (Dawkins *et al.,* 2017). However, once again, mixed results have been found regarding *job-based psychological ownership* and OCB. O'Driscoll, Pierce and Coghlan (2006), for example, established that *organisation-based psychological ownership* is a stronger predictor of OCB, than *job-based psychological ownership*. Pierce and Peng (2015), on the other hand, reported the opposite. However, culture may have been an influential factor in Pierce and Peng's (2015) study as it was conducted from an Eastern cultural perspective. Nevertheless, it would still be reasonable to propose that extra-role behaviour is linked to both *job-based* and *organisation-based psychological ownership*, and that employees will be willing to *contribute to team objectives*[22] and *furthering organisational goals*, over and above, *achieving personal targets*.

Dawkins *et al*. (2017) suggest that *psychological ownership* is likely to be associated with the extent to which members of an organisation feel there is a balance between effort and reward (Siegrist, 1996), that the organisation is supportive, and that they are being treated fairly (Eisenberger, Huntington, Hutchison & Sowa, 1986). This is turn, may motivate these individuals to display behaviour that benefits the organisation. The social exchange theory (Blau, 1964), which concerns the idea of reciprocity, may provide insight into the latter. The concept of a potential reciprocal relationship links back to Bandura's (1978) reciprocal determinism theory. According to Avey *et al*. (2009, p. 179), the exchange theory concerns the "effort applied due to the satisfying of needs by a particular organisational target." If an employee's *root needs* are satisfied by the job or organisation, the employee will be motivated to reciprocate (after developing feelings of ownership and responsibility) and may invest more of the self in order to contribute to organisational goals. Gouldner (1960) suggests that if the organisation provides the employee with a *sense of efficacy and effectance, sense of self-identity* and a valued *sense of belonging* (place), then they will be

[22] In addition to this, it seems even more plausible if part of the job concerns working with a team.

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motivated to reciprocate. This also links to *contributing to team objectives*. “The need to belong in a work place may be satisfied by a particular job, work team, work unit, division, organisation or industry as a whole” (Avey *et al.,* 2009, p. 178). If a team provides satisfaction of the *salient root needs* (i.e., a team that the employee can *identify* with, a place where the employee feels he/she *belongs*, and where the need for *efficacy and effectance* is satisfied), then the employee will be motivated to *contribute to team objectives* and performance.

In the conceptualisation of performance, Fishbein and Ajzen (1972) suggest that job attitudes must also be considered as they have a behavioural, affective and cognitive component. These attitudes have an impact on role behaviour and employee participation (Wright *et al.*, 2003), which in turn impacts organisational performance. Work-related attitude outcomes of *psychological ownership* include organisational commitment and job satisfaction (Van Dyne & Pierce, 2004). Peng and Pierce (2015) also found that *job-based psychological ownership* negatively predicted intention to quit. In other words, if an employee experiences *psychological ownership*, they will be motivated to maintain their relationship with the organisation (job), in comparison to severing it (Jussila *et al.,* 2015). Thus, they should be motivated to do what is required to maintain it.

Wagner, Parker and Christiansen (2003) reported that ownership beliefs, mediated by ownership behaviour, positively influence the organisation’s financial performance. One of the theorised reasons for this is due to the fact that employees believe the reward of their work is contingent on the performance of the organisation (Long, 1978). Wagner *et al*. (2003) argue that employees perceive the rewards and rights associated with ownership, and assume the risk and responsibilities associated with ownership (Duncan, 2001; Pierce *et al.,* 2001). They suggested that, consequently, individuals with *psychological ownership* should be more likely to make decisions that are in the long-term interest of the company. Employees who perceive the job to be ‘theirs’, will be more likely to *further organisational goals* due to their assumed responsibility not only towards their job, but also towards the organisation in which it is embedded. The following path-specific substantive research hypotheses are consequently postulated:

Hypothesis 19: In the proposed psychological ownership structural model it is hypothesised that job-based psychological ownership positively influences organisation-based psychological ownership.

Hypothesis 20: In the proposed psychological ownership structural model it is hypothesised that organisation-based psychological ownership positively influences

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an employee to accomplish objectives.

Hypothesis 21: In the proposed psychological ownership structural model it is hypothesised that organisation-based psychological ownership mediates the relationship between job-based psychological ownership and accomplishing objectives.

Wagner *et al*. (2003, p. 854) suggested that "recognition of employees' work-related accomplishments provides social reinforcement of the organization's goals." This in turn, provides employees with a better understanding of how their work affects the organisation's overall performance. By praising employees for their contribution, they take pride in and internalise the resultant success, which may lead to an increased sense of possession of their job and organisation. Through the recognition of employee performance, a sense of competence and influence is fostered (Wagner *et al.,* 2003). Additionally, Pierce *et al*. (2009) suggested that feedback will give rise to feelings of *job-based psychological ownership* as it provides an employee the opportunity to gain *intimate knowledge* of the job. In other words, through the successful accomplishment of objectives, an employee will obtain a better understanding of how well he/she is performing, which should influence his/her sense of ownership towards the job.

However, the question should be asked whether the effect of *accomplishing objectives* on *psychological ownership* will be direct? The level of performance achieved would first and foremost affect *motivation to perform* through its effect on *self-efficacy,* and the effect that *self-efficacy* has on the expectancy that effort will successfully translate into performance. This line of reasoning suggests that the current *psychological ownership* model would have to incorporate *job motivation* as a latent variable[23] (and not only *motivation to pursue the routes to psychological ownership*). Nevertheless, it could be argued that the effect of *accomplishing objectives* (i.e., *achieving personal targets, contributing to team objectives* and *furthering organisational goals*) will have both a direct and indirect effect on levels of ownership experienced by employees.

Although feedback on *accomplished objectives* can be viewed as one of the mechanism through which employees' feelings of ownership towards their job may increase, the importance lies with two internal processes. These include employees' greater sense of competence and the satisfaction of their *salient root needs*. According to Bandura (1986) if individuals are verbally persuaded to believe that they have the capabilities to perform a

[23] This argument will not be explored in this section, but rather in the recommendations for future research.

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particular task well, they develop a greater sense of competence and exert greater sustained effort towards job performance. It could thus be argued that when employees *accomplish objectives*, as opposed to simply being verbally persuaded, it increases their *self-efficacy* and enables them to feel competent to take *control of the job* and increase their *self-investment* into the job. In other words, through its effect on *self-efficacy*, *accomplished objectives* should satisfy the root need of e*fficacy and effectance. Achieving personal targets* could potentially satisfy the root need of *self-identity,* as the individual takes pride in their *job performance* and the job becomes an extension of the self. It could also be argued that successfully *contributing to team objectives* and *furthering organisational goals* could satisfy the root need of *belonging.* By *contributing to team objectives* and *furthering organisational goals*, the employee may feel that they have a target (job and organisation) where they feel at 'home' and where their contribution is valued and needed. It thus seems plausible to argue that successfully *achieving personal targets, contributing to team objectives* and *furthering organisational goals* will increase one's appetite for more. Based on the foregoing argument, the following path-specific substantive research hypotheses are consequently postulated:

Hypothesis 22: In the proposed psychological ownership structural model it is hypothesised that accomplishing objectives positively influences an employee's salient root needs.

Hypothesis 23: In the proposed psychological ownership structural model it is hypothesised that accomplishing objectives positively influences job-based psychological ownership.

2.3.10. Applying specialist expertise

This aspect of work performance refers to *utilising expert knowledge, applying specialist skills* and *sharing expertise.* For the purpose of the current study, *utilising expert knowledge* and *applying specialist skills* have been combined into a single dimension that can be applied in different contexts (i.e., the job itself and the larger organisation). Since Saville *et al*. (2013) have not formally defined[24] these subdimensions, distinguishing between these terms proved to be ambiguous and challenging. More specifically, *utilising expert knowledge* and *applying specialist skills* have been combined into *utilising/applying specialist expertise*

[24] These Saville *et al.* (2013) dimensions are usually used as performance indicators by supervisors when evaluating employee performance in the workplace and not as elaborate theoretical constructs. The researcher has consequently merged two of the three subdimensions of *applying specialist expertise (utilising expert knowledge* and *applying specialist expertise*) in order to ensure conceptual clarity and to establish a simplified constitutive definition for the current study. Nevertheless, as in its original format, the construct still has three subdimensions, namely 1) utilising/applying specialist expertise in the job; 2) utilising/applying specialist expertise to assist others or the organisation; and 3) sharing expertise.

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either *in the job* itself, or to *help others/the organisation* at large (with the latter being more altruistic in nature). The multidimensional construct *applying specialist expertise* therefore comprised of the following three dimensions: *utilising/applying specialist expertise in the job*, *utilising/applying specialist expertise to assist others or the organisation* and *sharing expertise*.

Gaining *intimate knowledge* constitutes one of the routes to *job-based psychological ownership*. Employees that have taken *psychological ownership* of their jobs are therefore more likely to possess job-relevant *expert knowledge* and *specialist skills* (i.e., *specialist expertise).* However, this *specialist expertise* is futile if not utilised or applied.

The willingness to *utilise* and *apply* job-relevant *specialist expertise* may stem from the need for *self-identity* and personal identification, which is a major source of internal motivation (Katz & Kahn, 1978). If an employee's self is closely connected to a particular job, they will be motivated to invest energy and time into it, and to be protective, caring and nurturing over it (Pierce *et al.,* 2001).

Along the same lines, Avey *et al*. (2009) suggested that when an individual's identity is integrated with an organisational target (i.e., the job), a person would express their identity through the target of ownership via desirable behaviours. When an employee's basic motives are fulfilled, they will be proactive in enhancing and protecting the target (Van Dyne & Pierce, 2004). Thus, an employee will consciously increase their effort in order to produce quality output. According to Van Dyne and Pierce (2004, p. 446), the "psychology of 'mine' should lead to conscientious role behaviours and high levels of job performance." In other words, an employee will be *motivated to perform* to the best of their ability in their job, if they feel that the job is theirs and that the work they are producing is a reflection of their identity.

Moreover, employees that have taken *psychological ownership* of their jobs should at the same time be able to perform well because of the manner in which they came to take ownership of the job (i.e., by *investing the self*, taking *control of the job* and gaining *intimate knowledge* about the job). In other words, they already had the means to travel the routes and take ownership of the job.

Furthermore, the capacity to control objects, may promote feelings of self-efficacy (Dawkins *et al.,* 2017, p. 168). If the employee has the opportunity to take *control* and experience resultant ownership of their job, it should provide him/her the confidence to utilise gained *intimate knowledge* and expertise. Stated differently, if an employee has *job-based psychological ownership*, he/she should be motivated to spend more time cognitively engaged, *utilising/applying their expert knowledge* and *specialist skills* in order to produce

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quality output *in the job.*

Based on the literature linking feelings of *psychological ownership* to OCB (e.g., Van Dyne & Pierce, 2004), it could be argued that an employee with *job-based psychological ownership* will go beyond what is required of them in terms of *utilising/applying specialist expertise in the job,* to *utilising/applying specialist expertise to assist colleagues/the organisation* at large*.* To a certain degree, this somewhat more altruistic subdimension is closely related to the third subdimension, namely *sharing expertise.*

Dawkins *et al.* (2017, p. 165) provided an example of a manager with promotive *psychological ownership* that will be more willing to share information that he/she "owns" due to the belief that sharing the information will benefit the company, if the individual perceives company enhancement as personally fulfilling. This line of reasoning also builds on the latter argument of *promotive psychological ownership* (Avey *et al.,* 2009) and the social exchange theory (Blau, 1964). If the individual's root motives are satisfied via aspects of the job (which is embedded in the organisation), the employee will be willing to reciprocate and *share expertise,* if this in turn should *further organisational goals*.

It should be acknowledged that the argument thus far does not attempt to claim that feelings of *psychological ownership* should increase an employee's non-malleable ability to perform[25], but rather that as a psychological state, it merely influences cognitions, emotions and resultant behaviour. The situational, contextual and intra-individual factors cannot be disregarded. The following path-specific substantive research hypothesis is consequently postulated:

Hypothesis 24: In the proposed psychological ownership structural model it is hypothesised that job-based psychological ownership positively influences an employee's motivation to apply specialist expertise.

2.4. SECOND-GENERATION EXPLANATORY STRUCTURAL MODEL

The proposed second-generation *psychological ownership* structural model is shown in Figure 2.3. Again, it must be acknowledged that the proposed structural model is not the only possible explanation for the phenomenon of interest, but rather an attempt at constructing a valid position on the identity of the latent variables and the manner in which they structurally combine in the complex nomological network of latent variables that regulate the levels of *psychological ownership.* The proposed *psychological ownership*

[25] The preceding argument did, however, suggest that through the route of gaining *intimate knowledge* a corollary outcome of *job-based psychological ownership* could be specialised job-relevant knowledge and skills.

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structural model may be considered valid if it is capable of explaining the covariances observed between measures of the latent variables comprising the model. A valid explanation does, however, not preclude the possibility of other equally valid, and even possibly more valid explanations. In the final analysis, no explanation can ever claim to reflect the truth. Explanations can only claim to be plausible if can be shown to be compatible with observations.

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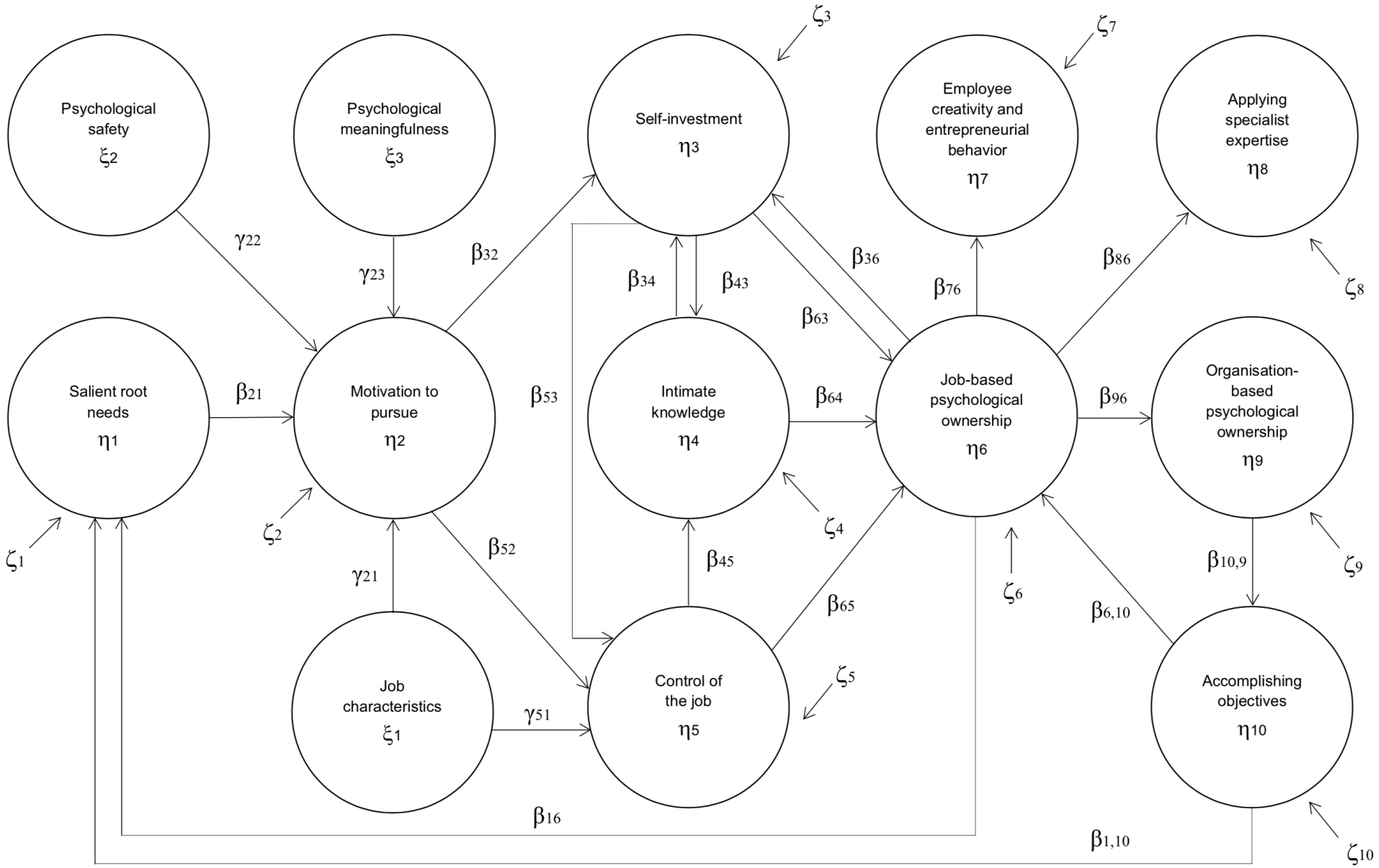

Figure 2.3. **Proposed psychological ownership structural model**

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CHAPTER 3

RESEARCH METHODOLOGY

3.1. INTRODUCTION

Scientific research is a "systematic, controlled, empirical, amoral, public, and critical investigation of natural phenomena" guided by theory and hypotheses about the phenomena (Kerlinger & Lee, 2000, p. 14). Industrial Psychology unconditionally commits itself to the scientific method of inquiry as it maximises the probability of valid, credible or permissible verdicts on the validity of hypotheses. This can be attributed to the scientific method's control mechanism, which compensates for the fallibility of human decision making (Theron, 2017a). According to Babbie and Mouton (2010), scientific research methodology serves the epistemological ideal of science. The epistemic ideal is the quest for valid knowledge[26] rather than the quest for truthful knowledge (Theron, 2017a). This is accomplished through objectivity and rationality that characterise the scientific method (Babbie & Mouton, 2010). Objectivity refers to the explicit, conscious effort (exerted by the researcher) to minimise error during the various stages of the research process. Whereas rationality refers to the extent to which the (knowledgeable) scientific community collectively weighs evidence in favour of or against new scientific claims before deciding to accept or reject such claims. This is done by critically evaluating the rigour of the method through which the evidence was generated.

The methodological considerations are thus the methods created and used to eliminate or control variables/factors that could potentially reduce the researcher's ability to come to valid conclusions on the validity of (explanatory, descriptive or evaluative) hypotheses (Kerlinger & Lee, 2000). There are a number of specific stages in an explanatory research process where the epistemic ideal is particularly vulnerable. Scientific objectivity operates through the knowledgeable researcher's insight into the nature of these epistemic threats and the methodological options through which they can be minimised. Whereas, scientific rationality operates by putting the researcher's methodological choices and their underlying rational up for inspection by knowledgeable peers. The extent to which the researcher's methodological choices remain obscure, scientific rationality in service of the epistemic ideal

[26] This raises the meta-theoretical question as to what constitutes valid knowledge? Viewed from a positivistic perspective, the term valid knowledge is interpreted as permissible epistemic (explanatory, descriptive or evaluative) statements that survived an opportunity to be empirically refuted (i.e., the statement agrees with, or is compatible with empirical observations made).

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is restrained. It is therefore critical that a thorough description of the research methodology undertaken during the study is provided.

Chapter 1 presented an introductory argument to the research-initiating question and research objective. The overarching second-generation research-initiating question asks the question: Why is there variance in *psychological ownership,* when statistically controlling for the latent variables included in the reduced Lee (2017) explanatory *psychological ownership* structural model? The current research study's research-initiating question therefore asks: What other latent variables and critical psychological conditions, besides those identified by Lee (2017), create variance in *psychological ownership*? Furthermore, the current study also intends focusing on the question concerning the potential reciprocal relationship between performance outcomes and *psychological ownership* that enquires: How do performance outcomes create variance in the psychological state of *psychological ownership*? The primary objective of this research study is thus to modify, elaborate and empirically investigate the *psychological ownership* structural model developed by Lee (2017). Chapter 1 also emphasised and justified the importance of cumulative research, as it increases the probability of obtaining a valid understanding of the phenomenon of interest, namely *psychological ownership*.

In Chapter 2, Lee's (2017) work was critically analysed and research hypotheses were derived through theorising, in response to the research-initiating question and research objectives. A second-generation explanatory structural model that describes the hypothesised psychological mechanism underpinning feelings of ownership, was consequently proposed. The current chapter outlines the methodology that was used in order to evaluate the validity of the proposed research hypotheses and *psychological ownership* structural model.

3.2. SUBSTANTIVE RESEARCH HYPOTHESES

Science dictates that the theoretical position developed through theorising be tested empirically in order to establish its validity. The overarching substantive research problem is the question whether the structural model depicted in Figure 2.3 provides a valid description of the psychological mechanism regulating differences in employee *psychological ownership*. The overarching research problem can also be dissected into a number of path-specific research problems asking whether the hypothesised direct effects of ξ_i on η_j and η_i on η_j are valid. Due to the fact that neither the overarching research problem nor the path-specific research problems can be directly tested, the overarching research problem was subsequently translated into an overarching substantive research hypothesis.

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The substantive research hypothesis was then again dissected into a series of path-specific substantive research hypotheses, indicating a positive or negative influence of ξ_i on η_j and η_i on η_j (Theron, 2017c). The overarching substantive hypothesis and the series of path-specific substantive research hypotheses were then empirically tested by deriving observable empirical implications from the hypotheses. Empirical support for the hypotheses would answer the overarching and path-specific problems in the affirmative.

Hypothesis 1 refers to the overarching substantive research hypothesis, namely that the structural model derived via theorising in response to the research-initiating question (Figure 2.3) provides a valid account of the psychological mechanism underpinning levels of *psychological ownership* and the reciprocal relationship of performance outcomes creating additional variance in *psychological ownership*. The overarching substantive hypothesis was dissected into the following twenty-three path-specific substantive research hypotheses:

Hypothesis 2: In the proposed *psychological ownership* structural model[27]it is hypothesised that *salient root needs* (η_1) positively influence *motivation to pursue the routes to psychological ownership* (η_2).

Hypothesis 3: In the proposed *psychological ownership* structural model it is hypothesised that *job characteristics* (ξ_1) positively influence *motivation to pursue the routes to psychological ownership* (η_2).

Hypothesis 4: In the proposed *psychological ownership* structural model it is hypothesised that *job characteristics* (ξ_1) positively influence *control of the job* (η_5).

Hypothesis 5: In the proposed psychological ownership structural model it is hypothesised that the extent to which an employee experiences *psychological meaningfulness* (ξ_3) will positively influence *motivation to pursue the routes to psychological ownership* (η_2).

Hypothesis 6: In the proposed *psychological ownership* structural model it is hypothesised that the extent to which an employee experiences *psychological safety* (ξ_2) will positively influence *motivation to pursue the routes to psychological ownership* (η_2).

Hypothesis 7: In the proposed *psychological ownership* structural model it is hypothesised

[27] The phrase *in the proposed psychological ownership structural model* is used on purpose to convey the fact that the hypotheses should be understood to mean that a given exogenous or endogenous latent variable explains variance in an endogenous latent variable, when holding all other effects that the model hypothesises for that endogenous latent variable constant.

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that *motivation to pursue the routes* (η_2) positively influences the extent to which an employee *invests* himself or herself into the job (η_3).

Hypothesis 8: In the proposed psychological ownership structural model it is hypothesised that *motivation to pursue the routes* (η_2) positively influences *control of the job* (η_5).

Hypothesis 9: In the proposed *psychological ownership* structural model it is hypothesised that *self-investment* (η_3) positively influences *control of the job* (η_5).

Hypothesis 10: In the proposed *psychological ownership* structural model it is hypothesised that the degree of *control of the job* (η_5) positively influences the extent to which an employee gains *intimate knowledge* of the job (η_4).

Hypothesis 11: In the proposed *psychological ownership* structural model it is hypothesised that *self-investment* (η_3) positively influences the extent to which an employee gains *intimate knowledge* of the job (η_4).

Hypothesis 12: In the proposed *psychological ownership* structural model it is hypothesised that the extent to which an employee gains *intimate knowledge* (η_4) will positively influence *self-investment* (η_3).

Hypothesis 13: In the proposed *psychological ownership* structural model it is hypothesised that *self-investment* (η_3) has a positive influence on *job-based psychological ownership* (η_6).

Hypothesis 14: In the proposed *psychological ownership* structural model it is hypothesised that the extent to which *intimate knowledge* of the job (η_4) is gained has a positive influence on *job-based psychological ownership* (η_6).

Hypothesis 15: In the proposed *psychological ownership* structural model it is hypothesised that control of the job (η_5) has a positive influence on *job-based psychological ownership* (η_6).

Hypothesis 16: In the proposed *psychological ownership* structural model it is hypothesised that *job-based psychological ownership* (η_6) positively influences an employee's *salient root needs* (η_1).

Hypothesis 17: In the proposed *psychological ownership* structural model it is hypothesised that *job-based psychological ownership* (η_6) negatively influences *self-investment* (η_3) (when controlling for *motivation to pursue the routes*).

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Hypothesis 18: In the proposed *psychological ownership* structural model it is hypothesised that *job-based psychological ownership* (η_6) positively influences *employee creativity and entrepreneurial behaviour* (η_7).

Hypothesis 19: In the proposed *psychological ownership* structural model it is hypothesised that *job-based psychological ownership* (η_6) positively influences *organisation-based psychological ownership* (η_9).

Hypothesis 20: In the proposed *psychological ownership* structural model it is hypothesised that *organisation-based psychological ownership* (η_9) positively influences an employee to *accomplish objectives* (η_{10}).

Hypothesis 21: In the proposed *psychological ownership* structural model it is hypothesised that *organisation-based psychological ownership* (η_9) mediates the relationship between *job-based psychological ownership* (η_6) and *accomplishing objectives* (η_{10}).

Hypothesis 22: In the proposed *psychological ownership* structural model it is hypothesised that *accomplishing objectives* (η_{10}) positively influences an employee's *salient root needs* (η_1).

Hypothesis 23: In the proposed *psychological ownership* structural model it is hypothesised that *accomplishing objectives* (η_{10}) positively influences *job-based psychological ownership* (η_6).

Hypothesis 24: In the proposed *psychological ownership* structural model it is hypothesised that *job-based psychological ownership* (η_6) positively influences an employee's motivation to *apply specialist expertise* (η_8).

3.3. RESEARCH DESIGN

The research design has two main purposes, namely to control variance and to answer the overarching research problem. In order to obtain an unambiguous answer to the overarching research problem, variance in the endogenous latent variables need to be controlled. The research design enables the researcher to maximise experimental (or systematic) endogenous latent variable variance, control extraneous endogenous latent variable variance and minimise error endogenous latent variable variance (Kerlinger & Lee, 2000). The research design is essentially the method, structure or plan through which the validity of the substantive research hypothesis is tested. The main function is to control variance in order to obtain empirical findings that can be unambiguously interpreted for or against the substantive research hypothesis (Theron, 2017c).

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The abovementioned substantive hypotheses were tested empirically via an *ex post facto* correlation design with two or more indicators per latent variable, and structural equation modelling (SEM) as the analysis technique. The motivation behind this design was that there is more than one exogenous latent variable that cannot be experimentally manipulated[28]. In addition to this, causal relations were hypothesised between the endogenous latent variables in the structural model. In order to test the model as an integrated and complex unit, SEM provided the best solution. Through the combination of statistical techniques, SEM enables the examination of a set of relationships between numerous independent latent variables and inter-related dependent latent variables (Tabachnick & Fidell, 2014).

Bentler and Chou (1987) described the process of SEM broadly as follows: on the basis of substantive theory, a model containing (systematic and random) error term vectors and parameters is developed. The model's underlying assumptions are used to develop the covariance or moment structure implications of the data, and the freed and fixed parameters of the model, as well as the constraints are imposed. In order to estimate the unknown parameters, a statistical method, such as maximum likelihood is used. This permits the assessment of the model's empirical adequacy by determining the degree of fit of the model to appropriate sample data.

The logic underlying an *ex post facto* correlation design, when using SEM as the analysis technique, revolves around the ability to find measurement model and structural model parameter estimates in order to replicate or reproduce the observed sample covariate matrix. Once the researcher has obtained measures on the observed variables, the observed covariance matrix is calculated. Estimates for the freed measurement and structural model parameters are obtained with the objective of reproducing the observed covariance matrix as closely as possible. Only if there is a high degree of fit between the observed and the estimated covariance matrices, then it can be assumed that the psychological processes portrayed in the structural model provides one possible explanation for the observed covariance matrix. In other words, the model provides a permissible or valid explanation in as far as the paths and parameter estimates are able to account for observations (i.e., the manner in which the measures of the latent variables in the model covary) in World 1 (Babbie & Mouton, 2010).

Conversely, if the fitted model fails to accurately reproduce the observed covariance matrix, it means that the structural model does not provide an acceptable explanation for the

[28] Even though *job characteristics* lends itself to manipulability, for the purpose of the current study, there will be no manipulation of the exogenous latent variables.

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observed covariance matrix. It is important to note that prior to this conclusion, evidence of measurement model fit is required (Theron, 2017c). The proposed *ex post facto* design is depicted in Figure 3.1 (given six X variables representing the three exogenous latent variables and twenty Y variables representing the ten endogenous latent variables).

$[X_{11}]$	. .	$[X_{1j}]$	. .	$[X_{16}]$	Y_{11}	. .	Y_{1j}	. .	$Y_{1,20}$
$[X_{21}]$	. .	$[X_{2j}]$	. .	$[X_{26}]$	Y_{21}	. .	Y_{2j}	. .	$Y_{2,20}$
:	. .	:	. .	:	:	. .		. .	
$[X_{i1}]$	. .	$[X_{ij}]$	. .	$[X_{i6}]$	Y_{i1}	. .	Y_{ij}	. .	$Y_{i,20}$
:	. .	:	. .	:	:	. .		. .	
$[X_{n1}]$	. .	$[X_{nj}]$	. .	$[X_{n6}]$	Y_{n1}	. .	Y_{nj}	. .	$Y_{n,20}$

Figure 3.1. **Ex post facto correlation design**

3.4. STATISTICAL HYPOTHESES

In an attempt to test the substantive research hypotheses quantitatively and harvest the benefits of quantification, namely more unambiguous communication and more sophisticated argumentation[29], the substantive research hypotheses were translated into statistical hypotheses through the research design (Theron, 2017c). Statistical hypotheses simply express an aspect of the original substantive hypotheses in statistical and quantitative terms (Kerlinger & Lee, 2000). As mentioned, the overarching substantive research hypothesis (**Hypothesis 1**) states that the proposed *psychological ownership* structural model provides a valid account of the psychological mechanism underpinning levels of psychological ownership and the reciprocal relationship of performance outcomes creating additional variance *in psychological ownership*. Should this hypothesis provide an exact description of the psychological mechanism that regulates the levels of *psychological ownership,* then the following exact fit null hypothesis is proposed:

H_{01a}: RMSEA = 0

H_{a1a}: RMSEA > 0

It should be acknowledged that this scenario is extremely unlikely because structural models are only close approximations of reality. The null hypothesis that the model has a close fit is more realistic, as it takes the error due to approximation into account (Diamantopoulos & Siguaw, 2000). Therefore, should the proposed substantive research hypothesis provide an

[29] Determining the conditional probability of sample results under the postulated hypotheses would have been impossible in the absence of mathematical and statistical quantitative argumentation.

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approximate description of the psychological mechanism that regulates the levels of *psychological ownership*, the following close fit null hypothesis is proposed:

H_{01b}: RMSEA $\leq$ .05

H_{a1b}: RMSEA > .05

In addition to the overall fit of the substantive research hypothesis, the path-specific substantive research hypotheses were also tested. If the comprehensive structural model were to fit the data reasonably well, the following path-specific coefficient hypotheses would be tested:

Hypothesis 2: In the proposed *psychological ownership* structural model it is hypothesised that *salient root needs* (η_1) positively influence *motivation to pursue the routes to psychological ownership* (η_2).

H_{02}: $\beta_{21} = 0$

H_{a2}: $\beta_{21} > 0$

Hypothesis 3: In the proposed *psychological ownership* structural model it is hypothesised that *job characteristics* (ξ_1) positively influence *motivation to pursue the routes to psychological ownership* (η_2).

H_{03}: $\gamma_{21} = 0$

H_{a3}: $\gamma_{21} > 0$

Hypothesis 4: In the proposed *psychological ownership* structural model it is hypothesised that *job characteristics* (ξ_1) positively influence *control of the job* (η_5).

H_{04}: $\gamma_{51} = 0$

H_{a4}: $\gamma_{51} > 0$

Hypothesis 5: In the proposed *psychological ownership* structural model it is hypothesised that the extent to which an employee experiences *psychological meaningfulness* (ξ_3) will positively influence *motivation to pursue the routes to psychological ownership* (η_2).

H_{05}: $\gamma_{23} = 0$

H_{a5}: $\gamma_{23} > 0$

Hypothesis 6: In the proposed *psychological ownership* structural model it is hypothesised that the extent to which an employee experiences *psychological safety* (ξ_2) will positively

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influence *motivation to pursue the routes to psychological ownership* (η_2).

H_{06}: $\gamma_{22} = 0$

H_{a6}: $\gamma_{22} > 0$

Hypothesis 7: In the proposed *psychological ownership* structural model it is hypothesised that *motivation to pursue the routes* (η_2) positively influences the extent to which an employee *invests himself or herself* into the job (η_3).

H_{07}: $\beta_{32} = 0$

H_{a7}: $\beta_{32} > 0$

Hypothesis 8: In the proposed *psychological ownership* structural model it is hypothesised that *motivation to pursue the routes* (η_2) positively influences *control of the job* (η_5).

H_{08}: $\beta_{52} = 0$

H_{a8}: $\beta_{52} > 0$

Hypothesis 9: In the proposed *psychological ownership* structural model it is hypothesised that *self-investment* (η_3) positively influences *control of the job* (η_5).

H_{09}: $\beta_{53} = 0$

H_{a9}: $\beta_{53} > 0$

Hypothesis 10: In the proposed *psychological ownership* structural model it is hypothesised that the degree of *control of the job* (η_5) positively influences the extent to which an employee gains *intimate knowledge* of the job (η_4).

H_{010}: $\beta_{45} = 0$

H_{a10}: $\beta_{45} > 0$

Hypothesis 11: In the proposed *psychological ownership* structural model it is hypothesised that *self-investment* (η_3) positively influences the extent to which an employee gains *intimate knowledge* of the job (η_4).

H_{011}: $\beta_{43} = 0$

H_{a11}: $\beta_{43} > 0$

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Hypothesis 12: In the proposed *psychological ownership* structural model it is hypothesised that the extent to which an employee gains *intimate knowledge* (η_4) will positively influence *self-investment* (η_3).

H_{012}: $\beta_{34} = 0$

H_{a12}: $\beta_{34} > 0$

Hypothesis 13: In the proposed *psychological ownership* structural model it is hypothesised that *self-investment* (η_3) has a positive influence on *job-based psychological ownership* (η_6).

H_{013}: $\beta_{63} = 0$

H_{a13}: $\beta_{63} > 0$

Hypothesis 14: In the proposed *psychological ownership* structural model it is hypothesised that the extent to which *intimate knowledge* of the job (η_4) is gained has a positive influence on *job-based psychological ownership* (η_6).

H_{014}: $\beta_{64} = 0$

H_{a14}: $\beta_{64} > 0$

Hypothesis 15: In the proposed *psychological ownership* structural model it is hypothesised that *control of the job* (η_5) has a positive influence on *job-based psychological ownership* (η_6).

H_{015}: $\beta_{65} = 0$

H_{a15}: $\beta_{65} > 0$

Hypothesis 16: In the proposed *psychological ownership* structural model it is hypothesised that *job-based psychological ownership* (η_6) positively influences an employee's *salient root needs* (η_1).

H_{016}: $\beta_{16} = 0$

H_{a16}: $\beta_{16} > 0$

Hypothesis 17: In the proposed *psychological ownership* structural model it is hypothesised that *job-based psychological ownership* (η_6) negatively influences *self-investment* (η_3) (when controlling for *motivation to pursue the routes*).

H_{017}: $\beta_{36} = 0$

H_{a17}: $\beta_{36} < 0$

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Hypothesis 18: In the proposed *psychological ownership* structural model it is hypothesised that *job-based psychological ownership* (η_6) positively influences *employee creativity and entrepreneurial behaviour* (η_7).

H_{018}: $\beta_{76} = 0$

H_{a18}: $\beta_{76} > 0$

Hypothesis 19: In the proposed *psychological ownership* structural model it is hypothesised that *job-based psychological ownership* (η_6) positively influences *organisation-based psychological ownership* (η_9).

H_{019}: $\beta_{96} = 0$

H_{a19}: $\beta_{96} > 0$

Hypothesis 20: In the proposed psychological ownership structural model it is hypothesised that *organisation-based psychological ownership* (η_9) positively influences an employee to *accomplish objectives* (η_{10}).

H_{020}: $\beta_{10,9} = 0$

H_{a20}: $\beta_{10,9} > 0$

Hypothesis 21: In the proposed *psychological ownership* structural model it is hypothesised that *organisation-based psychological ownership* (η_9) mediates the relationship between *job-based psychological ownership* (η_6) and *accomplishing objectives* (η_{10}).

H_{021}: $\beta_{96}\,\beta_{10,9} = 0$

H_{a21}: $\beta_{96}\,\beta_{10,9} > 0$

Hypothesis 22: In the proposed *psychological ownership* structural model it is hypothesised that *accomplishing objectives* (η_{10}) positively influences an employee's *salient root needs* (η_1).

H_{022}: $\beta_{1,10} = 0$

H_{a22}: $\beta_{1,10} > 0$

Hypothesis 23: In the proposed *psychological ownership* structural model it is hypothesised that *accomplishing objectives* (η_{10}) positively influences *job-based psychological ownership* (η_6).

H_{023}: $\beta_{6,10} = 0$

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H_{a23}: $\beta_{6,10} > 0$

Hypothesis 24: In the proposed *psychological ownership* structural model it is hypothesised that *job-based psychological ownership* (η_6) positively influences an employee's motivation to *apply specialist expertise* (η_8).

H_{024}: $\beta_{86} = 0$

H_{a24}: $\beta_{86} > 0$

3.5. SAMPLING

Even though the methodological ideal would be to include the whole target population or the theoretical totality of elements implied by the research-initiating question, in the investigation, it would not be practically feasible. Therefore, the only viable option is to investigate a sample of elements from the sampling population (Theron, 2017d). The sampling population represents those elements of the target population that have a positive probability of being selected. When planning sampling, two aspects should be considered, namely the representativeness of the sample and the statistical power of the analysis.

Prior to engaging in the evaluation of the proposed structural model, it is important to ensure that the sample used is representative of the "population that is relevant to the theoretical ideas being evaluated" (Bentler & Chou, 1987, p. 80). Babbie and Mouton (2010) suggest that if the aggregate characteristics of the sample closely approximate the same aggregate characteristics of the population, the sample is considered representative. Representativeness is a function of the sampling method used and the magnitude of the sampling gap between the target population and the sampling population. The second consideration, namely the statistical power of the subsequent analyses, is a function of the sample size, the type of analysis performed, the significance level chosen and other factors relevant to the particular analysis technique (Theron, 2017d).

In order to ultimately answer the research question and test the proposed *psychological ownership* structural model against data obtained from some sample of subjects (Bentler & Chou, 1987), the target and sample population, sampling method and appropriate sample size should be clarified.

3.5.1. Target population, sample population, and sampling method

The current study focuses on *job-based psychological ownership* and the influence of this psychological state on the levels of performance that employees achieve. This implies that the target population included all full-time employees, with different levels of skill,

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demographic profiles and cultural backgrounds, working at different levels within the organisation and employed by any type of organisation, profit or non-profit, private or public sector, in any country[30]. Operationalising the target population via a sampling population that minimises the sampling gap presented an insurmountable challenge. A substantial and non-ignorable sampling gap is thereby acknowledged.

There are two broad types of sampling methods available, namely probability and non-probability sampling (Babbie & Mouton, 2010). In a probability sampling procedure, "each element in the sampling population has a known, positive (not necessarily equal) probability of being selected into the sample" (Theron, 2017d, p. 2). With probability sampling, a 'random sample' can be selected from an existing sampling frame or list containing the names of everyone in the population that are of interest to the study (Babbie & Mouton, 2010). In terms of a non-probability sampling procedure, each element in the sampling population has an unknown probability of being selected (Theron, 2017d). Probability sampling procedures do not always guarantee a more representative sample (Kerlinger & Lee, 2000), but it does, however, increase confidence that a representative sample will be selected. Probability sampling does moreover permit inferential statistical analysis, while non-probability sampling (strictly speaking) does not. This can be attributed to the fact that the assumptions under which the sampling distribution follow a specific known mathematical distribution, no longer hold (Theron, 2017d). Probability sampling technique also allows the researcher to "make relatively few observations and generalize from those observations to a much wider population" (Babbie & Mouton, 2010, p. 164). Unfortunately, in many research situations, probability sampling is often unviable and impossible (Babbie & Mouton, 2010).

Even though a probability sampling procedure would have been preferred for the current study, due to practical and logistical issues, a non-probability sampling procedure was used to select a representative sample from the identified target population. The researcher can only invite employees to participate in the research and cannot compel any employee to participate, even if they would have been selected via a probability sampling procedure. In other words, even if a probability sampling procedure would have been utilised, employees will still self-select themselves into the eventual sample. It therefore seemed to make more

[30] The target population has purposefully not been limited to permanent, full-time employees in South African organisations. This decision is rooted in the assumption that the same psychological mechanism operates in various countries around the world. It is thereby not denied that country (or culture) may, as a main effect or as a moderator variable, affect endogenous latent variables in the model (i.e., that the intercept and/or slope parameters of the structural paths in the model may differ across countries). This includes the fact that the latent means of the latent variables in the model may differ across countries.

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sense to select the whole sampling population through invitation. The resultant sample, nonetheless, remains a non-probability sample.

The non-probability sampling technique that was used is known as convenience sampling, in which elements of the population that happened to be available and willing to participate, were included in the sample (Theron, 2017d). Kerlinger and Lee (2000) claim that this form of sampling is the weakest, yet the most frequently used. Although this method is justifiable on the grounds of feasibility, caution must be exercised when generalising from the resultant data (Babbie & Mouton, 2010). This sampling technique was also used by Lee (2017) and justified by stating that its weaknesses can to some extent be mitigated by expertise, research knowledge and taking care when selecting samples and statistical techniques. It is therefore acknowledged that by using this sampling technique, it implies increased caution in generalisation due to potentially decreased representativeness in the sample.

The sampling population for the current study comprised of employees employed at five organisations that operate within different industries (consulting and business services, engineering, transport and logistics, and retail and consumer). The institutional permission letter used to obtain approval from these organisations can be found in Appendix A. In addition to these organisations that granted institutional permission[31], two internet-based social media platforms, namely Facebook and LinkedIn were used for the distribution of the Psychological Ownership Questionnaire. The sampling population therefore also comprised of the researcher's Facebook 'friends' and LinkedIn contacts. These platforms mitigated the challenges faced in terms of obtaining institutional permission from large organisations. Furthermore, they enabled individuals to be included in the sample population with varying demographics, employed at organisations in different industries not only in South Africa, but also in other countries. It is acknowledged, however, that this method of recruitment is not without its limitations[32]. It could be argued that the diversity of the sample may have been jeopardised due to the demographics of the individuals being similar to that of the researcher. However, this was mitigated by requesting that Facebook 'friends' and LinkedIn contacts share the post verbatim with their 'friends' and contacts (while maintaining all aspects regarding the protection of privacy, confidentiality and anonymity of participants and their organisations). In other words, the sampling population therefore also included the 'friends' and contacts of the researcher's Facebook 'friends' and LinkedIn contacts who

[31] Although institutional permission for conducting research was granted by these organisations, not all employees employed at the organisation would necessarily have participated in the study. Moreover, Yuan, Bare, Johnson and Saberi (2014, p. 1) claim that "online recruitment is a feasible and efficient tool" for attracting survey participants.
[32] This will be discussed in more detail in the limitations of the study.

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shared the post with individuals in their network[33]. This ensured that individuals with demographics different from the researcher, also had the opportunity to participate. The concern about representativeness was also countered by having employees from the abovementioned organisations complete the questionnaire.

3.5.2. Sample size

Kerlinger and Lee (2000) suggest that the total amount of relevant information contained in the sample is not only determined by how the sample is drawn, but also the size of the sample. When determining the appropriate sample size, a few aspects should be considered. These include the number of freed model parameters to be estimated, the statistical power associated with the test of exact and close fit, the financial and time investment, as well as the logistical effort required (Theron, 2017d).

A myriad of different opinions exist regarding the ratio of observations to parameters estimated in the model. A rather stringent guideline by Hair, Black, Babin and Anderson (2010), for example, is that at least 15 observations are required for each parameter estimated in the model. Based on this suggestion, a fairly large sample size of 1155[34] would be appropriate for this study. Hair *et al*. (2010, p. 662) also provide the following guidelines regarding minimum sample sizes based on a model's basic measurement characteristics and complexity:

- Minimum sample size - 100: Models containing five or fewer constructs, each with more than three items (observed variables), and with high item communalities[35] (.6 or higher).
- Minimum sample size - 150: Models with seven or fewer constructs, modest communalities (.5), and no under-identified constructs[36].
- Minimum sample size - 300: Models with seven or fewer constructs, lower communalities (below .45), and/or multiple under-identified (fewer than three items) constructs.
- Minimum sample size - 500: Models with large numbers of constructs, some with lower communalities, and/or having fewer than three measured items.

Regarding the trustworthiness of parameters estimates and solutions, Bentler and Chou (1987) proposed an oversimplified guideline that may serve as a rule of thumb. Under normal and elliptical theory, especially when there are many indicators of latent variables and the associated factor loadings are large, they suggest a ratio as low as 5:1 for the

[33] It is acknowledged that the definition of the sampling population was to a certain degree vague and imprecise.
[34] 77 x 15 = 1155
[35] Item communality here refers to the squared factor loadings.
[36] Constructs are regarded as under-identified if they are represented by fewer than three indicators variables.

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sample size to the number of free parameters. They do, however, recommend that a ratio of 10:1 may be more appropriate for an arbitrary distribution. Based on this guideline, a sample size of between 385 and 770 would be considered appropriate for this study (with 77[37] freed parameters in the *psychological ownership* structural model).

When conducting a research study with SEM as the analysis technique, it is important to ensure that the sample is sufficiently large to ensure adequate power, yet not too large to make it practically impossible to not reject the close fit null hypothesis. In addition, when evaluating the credibility of the model fit findings, it is important to investigate the statistical power associated with testing the model. The statistical power refers to the conditional probability of rejecting the null hypothesis given that it is false or the probability of rejecting an incorrect model. Thus, statistical power in the context of SEM refers to the probability of rejecting the null hypothesis of close fit (H_0: RMSEA≤.05), when it should actually be rejected, in favour of the alternative hypothesis of mediocre fit (H_a: RMSEA>.05) (Theron, 2017d). In order to arrive at a valid conclusion on the validity of the model, a sufficiently large sample, that provides adequate statistical power is required (Lee, 2017).

Software in R, designed by Preacher and Coffman (2006), was used in the current study to calculate the required sample size for the test of close fit. To allow for a statistical power of .80, Preacher and Coffman's (2006) software suggested a sample size of 93.945. This was computed by specifying a RMSEA value of .05 under H_0, an RMSEA of .08 under H_a, a significance level (α) of .05, a power level of .80 and degrees of freedom of 274[38].

The final consideration when determining the sample size pertains to the resource, practical, and logistical aspects. This includes the financial and time investment, logistical effort required, the availability of a representative sample and the willingness of the desired organisations to agree to the participation request. Babbie and Mouton (2010) confess that researchers in developing countries, such as South Africa, have more of a struggle to acquire an adequate sampling frame, and even if it is available, it is subject to an extensive degree of error. Even though not all research situations require a large sample size, Comrey and Lee (1992) advise that samples with less than 50 provide inadequate reliability or correlation coefficients. Kerlinger and Lee (2000) suggest that sometimes it is appropriate to obtain an approximation to the sample size required. Therefore, the final sample size depends not only on calculations, but also on judgement and what is practically feasible.

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[37] The comprehensive LISREL model comprises of the following number of freed parameters: 4 γ, 18 β, 10 ψ, 6 λ^X, 10 λ^Y, 6 θ_δ, 20 $\theta\varepsilon$ and 3 ϕ. Each latent variable was operationalised via two composite indicator variables.

[38] (½ [(p+q)(p+q+1)] - t) = (½ [(26)(27)] – 77) = (½ [702] - 77) = 351 – 77 = 274
Where p is the number of exogenous indicator variables, q is the number of endogenous indicator variables, and t is the number of parameters in the comprehensive LISREL model that were freed to be estimated.

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Based on the latter argument, a sample size of 300 was considered adequate to obtain valid results for the current study.

An inevitable challenge faced when eliciting voluntary responses from employees, is the risk of a low response rate. In order to address this challenge, participants in the study were eligible for an entry into a lucky draw to win a two-day stay at Nedile Lodge, located in the Welgevonden Game Reserve. Upon completion of the Psychological Ownership Questionnaire, participants were invited to participate in the lucky draw. A new survey followed whereby participants were requested to provide their cellphone numbers. The new survey was in no way linked to participant's responses to the Psychological Ownership Questionnaire. Participation in the lucky draw was completely voluntary and not a prerequisite for completing the Psychological Ownership Questionnaire. Furthermore, an opt-out option was included for those who did not wish to participate in the lucky draw. Once a randomly selected participant was awarded with the voucher, the remaining cellphone numbers were deleted. Since the researcher was focused on protecting the confidentiality and anonymity rights of participants throughout the process and at all costs, no other participants were contacted other than the winner. The incentive proved to be very beneficial in increasing employees' motivation to participate in the study and consequently, the resultant sample size (described in Chapter 5).

3.6. MEASUREMENT INSTRUMENTS

According to Kerlinger and Lee (2000), one of the key building blocks for research is measurement. Measurement refers to the assignment "of numbers to observations in order to quantify phenomena" (Kimberlin & Winterstein, 2008, p. 2276). In order to test the validity of the claims outlined in the substantive and statistical hypotheses, and ultimately the model fit, the construct of *psychological ownership* and the proposed latent variables that influence its levels, were operationalised (Lee, 2017). Operationalisation transforms latent variables/constructs into indicator/manifest variables (Theron, 2017e). Each latent variable in the *psychological ownership* structural model was ultimately represented by two composite indicator variables created via item parcelling. It is acknowledged, however, that this decision may be in conflict with the general recommendation that item parcels should be unidimensional (Bandalos, 2002); especially for the multidimensional scales[39]. This section outlines the measurement instruments that were used to gather data and evaluate

[39] The domain-representative parcelling strategy described by Little, Rhemtulla, Gibson and Schoemann (2013) was used in which each parcel is representative of the whole domain of the multidimensional construct.

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employees' standing on each of the various latent variables in the *psychological ownership* structural model. The Psychological Ownership Questionnaire can be found in Appendix B.

3.6.1. Job characteristics

The revised Job Diagnostic Survey (JDS-R) by Idaszak and Drasgow (1987) is a 30-item scale that measures the five *job characteristics,* namely *autonomy, task identity, skill variety, task significance* and *feedback*, three psychological states, and core personal and work outcomes. It elicits responses on a seven-point Likert scale, ranging from 1= *disagree strongly* to 7= *agree strongly*. In a study conducted by Buys, Olckers and Schaap (2007) alpha coefficients ranging between .67 and .79 for the various subscales were obtained. Lee (2017, p. 143) also obtained alpha coefficients ranging between .77 and .85 for the various subscales. Evidence of acceptable fit and reliability in the South African context was also found by Van Loggerenberg (2012), after testing the construct validity of the JDS-R in the diverse South African context. Sections one and two of the JDS-R was used in the current study as these sections pertain to the five core *job characteristics*. These sections measure the five subscales with 15 items.

Even though Lee (2017) proposed having five indicator variables for this construct to ensure that all indicator variables across latent variables have more or less the same magnitude; in the end, two indicator variables were used instead. In the current study, *job characteristics* was also represented by two composite indicator variables, which were obtained by calculating the mean of the even and uneven numbered items.

3.6.2. Routes to psychological ownership

The *routes to psychological ownership*, namely *self-investment, intimate knowledge* and *control of the job* were measured with an updated version of the same instrument that was used by Lee (2017). More specifically, the items were developed and adapted by Brown *et al*. (2014) who combined a six-item measure of *control* from a study conducted by Tetrick and LaRocco (1987) (α= .86) with a self-developed four-item measure of *self-investment* (α= .86), and a four-item measure of *intimate knowledge* (α= .83) (Brown *et al.*, 2014).

The *control* subscale items were endorsed on a seven-point Likert scale that ranged from 1= *not at all* to 7= *a very great extent*. The *self-investment* and *intimate knowledge* items were endorsed on a seven-point Likert scale that ranges from 1= *strongly disagree* to 7= *strongly agree*. The psychometric properties of this composite Routes to Psychological Ownership Scale were evaluated by Brown *et al*. (2014) and not only did the evidence

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indicate satisfactory reliability, but it also validated the route variables as independent constructs from each other and from *psychological ownership* itself.

Two item parcels were calculated for each of the three *routes to psychological ownership* separately. This was done by calculating the mean of the even and uneven numbered items of each subscale in order to form two composite indicator variables for each *route*.

3.6.3. Psychological ownership

The foci and conceptualisation of *psychological ownership* varies across the numerous scales that have been developed over the years (Avey *et al.,* 2009; Druskat & Kubzansky, 1995; Van Dyne & Pierce, 2004). Since the current study conceptualised *job-based psychological ownership* as a unidimensional construct, a measure originally developed by Van Dyne and Pierce (2004) and adapted by Brown *et al*. (2014) was used. This instrument was also used by Lee (2017) to measure *job-based psychological ownership*. Brown *et al*.'s (2014) scale is a six-item instrument, which uses a seven-point Likert scale that ranges from 1= *strongly disagree* to 7= *strongly agree*. It has been reported that this instrument has a Cronbach alpha of .96 and .93 (Pierce & Jussila, 2011). Lee (2017) obtained a highly satisfactory Cronbach alpha of .94, with inter-item correlations of above .05 for the six-item *psychological ownership* scale. Furthermore, the exploratory factor analysis (EFA) results indicated that all items satisfactorily load onto the single extracted factor and that a single factor solution provided a satisfactorily plausible explanation for the observed inter-item correlation matrix (Lee, 2017) .

Two item parcels were used as an aggregate level indicator (Little, Cunningham, Shahar & Wildaman, 2002) of *job-based psychological ownership*. These two indicator variables were created by taking the mean of the even and uneven numbered items.

Organisation-based psychological ownership was measured with a four-item instrument developed by Van Dyne and Pierce (2004). These items were endorsed on a seven-point Likert scale, ranging from 1= *strongly disagree* to 7= *strongly agree*. This instrument was also used by Pierce and Peng (2015), who obtained an alpha coefficient of .88 for the scale. In order to ensure that the organisation focus of *psychological ownership* was captured, two additional items were added to the scale ('I feel as if the company belongs to me' and 'I feel as if I am part-owner of this company'). The final scale therefore included six items. *Organisation-based psychological ownership* was also represented by two indicator variables that were created by taking the mean of the even and uneven numbered items comprising the scale.

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3.6.4. Psychological safety

Psychological safety refers to "feeling able to show and employ one's self without fear of negative consequences to self-image, status, or career" (Kahn, 1990, p. 708). In other words, *psychological safety* is perceived safety experienced by an individual; the extent to which an individual feels that self-expression will not negatively affect the self or job (Lee, 2017). The scale that was used in the current study to measure *psychological safety* was also used by Lee (2017). It was originally utilised and adapted by Van Deventer (2015) and consists of nine items from three different *psychological safety* scales (Brown & Leigh, 1996; Liang, Farh & Farh, 2012; May *et al.,* 2004). Even though Van Deventer's (2015, p. 194) items represent a "supervisory support" factor and a "free to be authentic" factor, in the current study, only the five items representing the "free to be authentic" factor was used. These items were endorsed on a five-point Likert scale, ranging from 1= *strongly disagree* to 5= *strongly agree*. Lee (2017) obtained a Cronbach alpha of .88 for this scale[40]. Two item parcels were created for *psychological safety* by calculating the mean of the even and uneven items of the subscale. *Psychological safety* was therefore represented by two composite indicator variables.

3.6.5. Psychological meaningfulness

Hackman and Oldham (1975, p. 162) conceptualised the psychological state of experienced meaningfulness of work as the "degree to which the employee experiences the job as one which is generally meaningful, valuable, and worthwhile." In the current study, *psychological meaningfulness* was measured with a six-item scale (α= .92; Woods & Sofat, 2013) obtained from May, Gilson and Harter (2004). Items require participants to respond to questions such as: 'The work I do on this job is worthwhile' and 'My job activities are personally meaningful to me'. When designing the scale, Hackman and Oldham's (1975) three-item measure of experienced meaningfulness of work ('The work I do on this job is very meaningful to me'; α= .72) (Brown *et al.,* 2014) was also considered and added to the scale. These final six items were endorsed on a five-point Likert scale that ranged from 1= *strongly disagree* to 5= *strongly agree* (Woods & Sofat, 2013).

Two composite indicator variables were created by taking the mean of the even and uneven numbered items. Therefore, *psychological meaningfulness* was represented by two composite indicator variables.

[40] A more thorough discussion regarding the psychometric properties can be found in Lee (2017).

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3.6.6. Salient root needs

As mentioned, new items that align with the proposed unidimensional definition of *psychological ownership* were developed in Lee's (2017) study. The process commenced by generating a pool of items that were scrutinised by subject matter experts who were tasked to determine the appropriateness of each item, grounded on the proposed definition of the root need dimension it was earmarked to reflect. Items that were relevant, according to subject matter experts were maintained, several were reworded, and some suggestions were incorporated. A copy of the item analysis sheet is included in Appendix 1 in Lee (2017). The psychometric properties of these items were assessed as part of Lee's (2017) work. Lee (2017) reported Cronbach alphas of .828 for the *efficacy and effectance* subscale, .835 for the *self-identity* subscale, and .813 for the *sense of belonging* subscale. Each subscale had four items and were endorsed on a seven-point Likert scale, ranging from 1= *strongly disagree* to 7= *strongly agree.*

Since *root needs* were conceptualised as three separate individual needs, the construct is considered multi-dimensional. Lee (2017) used mean scores to represent each sub-dimension, namely the need *for efficacy and effectance*, need for *self-identity* and the need to *belong* that comprise this latent variable. The reasoning behind this was to ensure that all the indicator variables across latent variables have the same magnitude, more or less. However, for the purpose of the current study the *salient root needs* were represented by two indicator variables calculated across the three subscales.

3.6.7. Motivation to pursue

Considering the fact that motivation, in the context of the current and Lee's (2017) study, refers to the *motivation to pursue the routes* to *psychological ownership*, finding an existing instrument proved to be a challenge. This necessitated the development of new items to operationalise the construct of *motivation to pursue the routes.* Lee (2017) suggested and presented 18 items to subject matter experts who's recommended changes were acknowledged and implemented. Nine of the items were designed to measure the *valence* associated with the *routes to psychological ownership* and the other nine were designed to measure the *expectancy* associated with the *routes to psychological ownership.* The items of both scales were endorsed on a seven-point Likert scale. The psychometric properties of the items were evaluated by Lee (2017) via item analysis. Lee (2017) obtained alpha coefficients of .87 for the *valence* subscale, and .90 for the *expectancy* subscale. A complete account of the psychometric properties of this scale can be found in Lee's (2017) Chapter 5. The factor structure in the *motivation to pursue the routes to psychological ownership*

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scale turned out to be more complex than originally anticipated. Six narrow factors representing the *valence* and *expectancy* of each of the three routes, along with a broad general motivation factor, was required to adequately explain the observed inter-item covariance matrix (Lee, 2017).

Two item parcels were calculated for the *motivation to pursue the routes to psychological ownership* by calculating the mean of the even and uneven numbered valence and expectancy items. Resultantly, this construct was represented by two composite indicator variables.

3.6.8. Employee creativity and entrepreneurial behaviour

Employee creativity refers to the capacity and extent to which employees generate useful and novel ideas (Amabile, 1988). According to Ward (2004) creativity is a complex phenomenon that requires theoretical models that combine personality traits, cognitions, affect and environmental influences. Tierney, Farmer and Graen (1999) has developed and validated a nine-item *employee creativity* scale. Tierney *et al*. (1999) adapted four of the nine items from Ettlie and O'Keefe's (1982) self-report instrument. This instrument requires supervisors to indicate the extent to which each of the nine creative behaviours characterise an employee on a five-point Likert scale (ranging from 1= *not at all characteristic* to 5= *very characteristic*). Cronbach alphas of .94 and .95 have been reported for this scale (Cohen-Meitar *et al.,* 2009). However, in the current study, *employee creativity* was measured with eight items, adapted from Tierney *et al*.'s (1999) nine-item scale. Furthermore, due to practical and logistical limitations, the scale was also transformed to a self-report instrument by adapting the instructions and responses to a seven-point Likert scale, ranging from 1= *strongly disagree* to 7= *strongly agree*.

As mentioned, the actions of managers that explicitly refer to the exploitation and discovery of unnoticed entrepreneurial opportunities is known as individual-level *entrepreneurial behaviour* (Kuratko, 2010; Shane & Venkataraman, 2000). This includes scanning the environment for threats and opportunities (Kraut, Pedigo, McKenna & Dunnette, 2005), and identifying new means to reconfigure existing businesses or creating new ones (Hornsby *et al.,* 2009). In the current study, individual-level *entrepreneurial behaviour* was measured with a six-item scale utilised and adapted by Sieger *et al.* (2013) based on items from Eddleston and Kellermanns (2007); Dyer, Gregersen and Christensen (2008), and Pearce, Kramer and Robbins (1997). These items were endorsed on a seven-point Likert scale, ranging from 1= *strongly disagree* to 7= *strongly agree* (α= .83) (Sieger *et al.,* 2013). After scrutinising the items of both of the *employee creativity* scale and the *entrepreneurial*

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behaviour scale, item six of the *employee creativity* scale ('I identify opportunities for new products/processes') and item four of the *entrepreneurial behaviour* scale ('I often generate new ideas by observing our customers') were switched. This decision was based on the belief that item six of the *employee creativity* scale actually denotes *entrepreneurial behaviour* and that item four of the *entrepreneurial behaviour* scale rather reflects *employee creativity* .

Despite the fact that *employee creativity and entrepreneurial behaviour* is a two-dimensional construct, two item parcels were created by calculating the means of the even and uneven numbered items of both scales. In other words, the variable *employee creativity and entrepreneurial behaviour* was represented by two composite indicator variables

3.6.9. Global performance

Due to the multidimensionality of *work performance*, two dimensions of a measure developed by Saville *et al*. (2008), namely the Saville Consulting Wave Performance 360 were used. The instrument is a multi-rater questionnaire with 36 behavioural dimensions, six ability dimensions and three areas of global work effectiveness. As mentioned, of importance to the current study is the global areas of performance as it measures overall work effectiveness, that cover both individual task as well as contextual performance. Global performance includes three sections that break down into nine dimensions. The three sections include *accomplishing objectives, applying specialist expertise* and *demonstrating potential*. The reliability of the global (overall) performance composite is .75 (Saville *et al.,* 2013). With permission/consent[41] from the developers, the dimensions and subdimensions pertaining to *accomplishing objectives* and *applying specialist expertise* were used to develop items for the current study. *Accomplishing objectives* includes *achieving personal targets, contributing to team objectives* and *furthering organisational goals*. *Applying specialist expertise* includes *utilising expert knowledge, applying specialist skills* and *sharing expertise* (Saville *et al.,* 2013). As mentioned in Chapter 2, the dimensions of *applying specialist expertise* were changed to *utilising/applying specialist expertise in the job*, *utilising/applying specialist expertise to assist others and/or the organisation*, and *sharing expertise.*

The item development process involved generating a pool of items that were scrutinised by subject matter experts who were tasked to determine the appropriateness of each item. Items that were relevant, according to subject matter experts were maintained, some were

[41] The letter of instrument usage request, for which permission was granted, is included in Appendix C.

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reworded, and some suggestions were incorporated. *Accomplishing objectives* was ultimately measured with eight items, while *applying specialist expertise* was measured with six items. Both scales were endorsed on a seven-point Likert scale (1= *strongly disagree* to 7= *strongly agree*). As part of the study, the psychometric properties of these items were evaluated via item analysis and confirmatory factor analysis (CFA). The results of these analyses are reported in Chapter 5.

Accomplishing objectives and the *applying specialist expertise* were represented by two indicator variables each. Two item parcels were calculated for both variables by calculating the mean of the sum of the even and uneven numbered items.

3.7. STATISTICAL ANALYSIS

Kerlinger and Lee (2000) suggest that statistics is the method and theory of analysing quantitative data obtained from samples of observations in order to study and compare sources of variance of phenomena. This is done in order to make decisions to either reject or not to reject hypothesised relations between phenomena, and to assist in drawing reliable inferences from empirical observations. There are various different statistical techniques available to aid in ultimately answering the overarching substantive research hypothesis.

In order to determine the success of the operationalisation, the data collected from the measurement instruments were analysed via different statistical techniques. Item analysis, EFA, CFA and structural equation modelling (SEM) were used to test the *psychological ownership* structural model depicted in Figure 2.3.

3.7.1. Missing values

It is important to acknowledge the problem of missing data or values before statistical analysis can be undertaken. According to Tabachnick and Fidell (2014), the quantity and pattern of the missing data, and the reasons behind it determine the seriousness of this challenge. Missing data can be classified as either missing at random (MAR), missing completely at random (MCAR) or missing not at random (MNAR) (Allison, 2001; Osborne, 2013; Schafer & Graham, 2002; Tabachnick & Fidell, 2014). There are a number of different techniques or methods available to treat missing data (Osborne, 2013). These techniques or methods include deletion techniques, namely list-wise and pair-wise deletion, single imputation methods, namely mean/mode substitution, and model-based methods, such as maximum likelikhood and multiple imputation (Allison, 2001; Du Toit & Du Toit, 2001).

A scale that provides an ‘unable to respond’ option mitigates the risk of a respondent skipping a certain item. For example, electronic scales that include this question prevents

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forced, artificial responses or a circumstance where a respondent is really unable to respond meaningfully (Lee, 2017) or at all. These 'unable to respond' should, however, still be defined as missing values and treated accordingly. The method of treatment of missing values, however, cannot be determined in isolation, as it should be evaluated in terms of the estimation, modelling or testing procedure in which it is embedded (Schafer & Graham, 2002). In the current study, the final decision on which approach to use to treat the missing-value problem was only made once the extent and nature of the missing values in the data was determined.

3.7.2. Item analysis

A measuring instrument informs the researcher of a respondent's standing on a specific latent variable of interest. The items that comprise the measurement tool should function as stimuli to elicit the respondent's behaviour, which is essentially an expression of the individual's standing on the underlying latent variable. Based on this assumption, it is crucial to evaluate the psychometric integrity of the scales identified in paragraph 3.6 in order to determine whether the items accurately represent the constitutive definition of the latent variable (Murphy & Davidshofer, 2014).

The ideal when operationalising a latent variable through a mutli-indicator measured operational definition, is that the variance in X_j (or Y_j) should be attributed only to the variance in ξ (or η). Even though this ideal is never fully attainable, the researcher strives to approximate this ideal through the processes of standardisation and item analysis. Standardisation attempts to control extraneous variance in the item responses by controlling irrelevant variables that could cause variance in the item responses if they were allowed to vary across individuals and assessment opportunities. Item analysis attempts to identify items in which the response is not primarily determined by the latent variable of interest. In other words, item analysis concerns the attempt to detect invalid, biased and unreliable items (Theron, 2017e).

Murphy and Davidshofer (2014, p. 225) suggest that item analysis "refers to a set of procedures for analysing responses to test items and the relationships between item characteristics and test characteristics." When tests are unreliable or fail to show expected levels of validity, a good item analysis can often be informative and suggest ways of improving the measurement characteristics of a test. They also suggest that "tests are sometimes limited in their reliability or validity because they contain items that are poorly worded or that are trick questions requiring complex mental gymnastics." By removing these poor items, the reliability and validity of a test can generally be improved.

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Poor items are items that fail to reflect the focal underlying common latent variable (i.e., items that do not share a reasonable proportion of variance), or that fail to discriminate between relatively small differences in the level of the focal latent variable. In the current study, SPSS 25 was used to perform item analysis. The decision to delete any item was not be based on any single item statistic. Instead, an integration of statistical evidence was used in order to determine whether an item should be removed or not.

3.7.3. Dimensionality analysis

According to Babbie and Mouton (2010, p. 472), factor analysis is used in order to uncover predominant patterns "among the variations in values of several variables." It requires generating artificial dimensions (factors) that are independent of one another (or that are allowed to correlate, depending on the rotation method chosen) and that correlate highly with several of the observed variables. A factor refers to a latent variable, a hypothetical entity, a construct that is assumed to underlie items, scales, tests and measures (Kerlinger & Lee, 2000). By carrying out a factor analysis, "the interpretation of data is simplified by reducing the number of variables," and the research focus shifts from "specific tests to more general factors, which have many of the same characteristics of constructs" (Murphy & Davidshofer, 2014, p. 88).

One of the assumptions of classical measurement theory is that the items within a subscale or scale that represent the latent variables of interests, are unidimensional. In other words, that each of the subscales only measure a single underlying construct or latent dimension of a construct. Therefore, it is important to determine whether the subscale's items reflect a single underlying (indivisible) latent variable, and provide a relatively uncontaminated measure of this single underlying variable that it is designed to reflect (Murphy & Davidshofer, 2014).

EFA is a statistical technique that is generally used to evaluate whether the unidimensionality assumption is satisfied. DeVellis (2012) suggest that this analysis provides clarity regarding how many latent variables underlie a subscale, and aids in determining whether the items actually reflect the single latent variable that they are supposed to reflect [42]. An empirical assessment of the dimensionality of a set of items can be evaluated through factor analysis by determining the number of factors and the loadings

[42] The current study acknowledges that the use of EFA can be critiqued as it is logically incompatible with the fact that the scales and subscales have been purposefully developed to reflect the standing on a unidimensional (indivisible) latent variable or latent dimension of a multidimensional latent variable. The question that needs to be answered is whether this design intention succeeded. Logically, a confirmatory, hypothesis testing approach that explicitly tests the unidimensionality assumption, rather than an exploratory approach would therefore also have been appropriate.

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of each variable on the factors (Hair *et al.,* 2010). In other words, it indicates whether each subscale consists of items loading highly on a single latent variable (or factor) and essentially demonstrates the success with which an indicator variable represents the latent variables within the *psychological ownership* structural model (DeVellis, 2012; Hair *et al.,* 2010; Tabachnick & Fidell, 2014).

There are a number of methods available for extracting factors from a correlation matrix, including maximum likelihood, minimum residual, power vectored, principal axis factor, and centroid (Kerlinger & Lee, 2000). Principal axis factor analysis (with oblique rotation) was the method most appropriate for the current study. This is due to the fact that the objective was to remove items with inadequate factor loadings, and/or split heterogeneous sub-scales into two/more homogenous subsets of items where necessary (Murphy & Davidshofer, 2014). However, principal component analysis was used in two instances where a factor could not be extracted with principal axis factor analysis.

In the situation of factor fission (more than one factor underlying the items) (Field, 2005) the following steps were performed. The first-order measurement model was fitted that reflected the loading pattern in the pattern matrix[43]. If the first-order measurement model obtained close fit (i.e., the close fit null hypothesis was not rejected), a second-order model was fitted in which the two (or more) extracted factors loaded on a single second-order factor via CFA. If the second-order measurement model fitted closely, the SIMPLIS syntax of the second-order measurement model was translated to LISREL syntax. This then allowed the requesting the calculation of t additional parameters via the PA=t command on the MO command line and the calculation of the t indirect effects via a series of t CO commands. If these indirect effects of the second-order factor on the subscale items were evaluated as statistically significant ($p<.05$), it was concluded that the items of the subscale may be regarded as valid indicators of the second-order factor underpinning the subscale.

If the first-order measurement did not obtain acceptable fit, the modification indices for the off-diagonal of the measurement error variance-covariance matrix were examined. If a reasonable percentage of the modification values calculated for the off-diagonal of the measurement error variance-covariance matrix Θ_{δ} were statistically significant, it pointed towards the need to rather fit a bi-factor model.

[43] The pattern matrix displays the partial regression slope coefficients when regressing the items on the two (or more) extracted factors. The loadings in the pattern matrix therefore reflect the influence of an extracted factor on an item when controlling for the influence of the other extracted factor (or factors) in both the item and the factor (Tabachnick & Fidell, 2014).

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Reise (2012, p. 668) explains that a bifactor structural model "specifies that the covariance among a set of item responses can be accounted for by a single general factor that reflects the common variance running among all scale items and group factors that reflect additional common variance among clusters of items, typically, with highly similar content." Bifactor modelling was thus considered ideal for representing the construct-relevant multidimensionality of some of the latent constructs included in the study when a first- and second-order conceptualisation of the multidimensional construct failed to be supported by the data. The broad, general factor was conceptualised to explain item variance that was not explained by the narrow, more specific factors. The bi-factor model was subsequently fitted with the correlation between the broad, general factor and the two (or more) narrow, more specific factors constrained to zero. If the bifactor model obtained close fit, the statistical significance of the factor loadings on the broad, general factor and the specific, narrow factor that the items were earmarked to reflect, was evaluated. The R^2 for each item was also examined.

The items of the subscale were regarded as valid indicators of the multidimensional construct (measured by the subscale), firstly, if the items statistically significantly ($p<.05$) loaded on the general factor and the narrower group factor they were designated to reflect[44]. Secondly, if at least 25% of the variance in each item could be explained by the two factors linked to it.

3.7.4. Structural equation modelling

Diamantopoulos and Siguaw (2000) argue that structural equation models, also known as covariance structure models, are widely used in a number of disciplines, including marketing, psychology, economics and sociology. SEM is a multivariate statistical technique that combines econometric modelling and (confirmatory) factor analysis in order to analyse hypothesised relationships among latent (theoretical/unobserved) variables measured by manifest (empirical/observed) indicators. SEM is confirmatory in nature in that it seeks to confirm the relationships hypothesised between and among the latent variables, and that the manifest indicators are, in fact, consistent with the empirical data at hand. They furthermore explain that typically, a full covariance structure model (also known as the comprehensive LISREL model) is comprised of two sub-models, namely the measurement model and structural model. Tabachnick and Fidell (2014) claim that SEM is the only

[44] This represents the optimistic, ideal scenario. The items of the subscale were also regarded as valid indicators of the multidimensional construct measured by the subscale if the items statistically significantly ($p<.05$) loaded on the general factor **or** the narrower group factor they were designated to reflect, and there were sufficient numbers that obtained significant loadings on each factor.

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analysis technique that allows for simultaneous and complete testing of all the relationships within a model. This proves to be beneficial, especially in the realm of Industrial Psychology. This is because the phenomena of interests are multifaceted and complex, and by isolating certain relationships, the meaning and interpretation of the complexity captured in a model may be diluted (Cilliers, 1998).

3.7.4.1. Variable type

In the current study, continuous variables, measured on an interval level, were used. This is due to the fact that composite indicator variables were used to represent the latent variables within the proposed *psychological ownership* structural model. Declaring the variable type as continuous is beneficial in the sense that "the type of information presented for variables that have been denoted as continuous is much more extensive than that for ordinal variables" (Diamantopoulos and Siguaw, 2000, p. 5). Millsap and Maydeu-Olivares (2009, p. 78) emphasise that "when all variables are continuous, it is typical to assume a multivariate-normal model." This assumption, however, first needs to be tested in order for it to be satisfied. The following section describes the critical assumption of multivariate normality when using SEM.

3.7.4.2. Multivariate normality

It is important to assess the extent to which the data complies with statistical assumptions before proceeding with further analyses. One of the assumptions of SEM and multivariate statistics is that the indicator variables (continuous in nature) that are used to operationalise the latent variables, follow a multivariate normal distribution. In addition to this, the assumption of univariate values of skewness and kurtosis must also be examined. The test for univariate normality evaluates each indicator individually with regards to the standardised coefficients of skewness and kurtosis, and whether these are significantly different from zero. Significant skewness and/or kurtosis values indicates departure from normality (Du Toit & Du Toit, 2001). The univariate and multivariate normality of the composite indicator variables was evaluated using PRELIS (Jöreskog & Sörbom, 1996). Due to the fact that the maximum likelihood (ML) estimation technique[45] assumes that the indicator variables follow a multivariate normal distribution (Du Toit & Du Toit, 2001), the decision regarding the most appropriate estimation technique was only made after the test for normality. Due to the continuous nature of the indicator variables, the inter-indicator variance-covariance matrix was analysed rather than the inter-indicator correlation matrix.

[45] Maximum likelihood is the default method of estimation when fitting both the measurement model and structural model to continuous data.

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3.7.4.3. Fitting the measurement model via confirmatory factor analysis

Diamantopoulos and Siguaw (2000) suggest that the measurement model describes how each latent variable is operationalised or measured by corresponding (composite) manifest indicators. Furthermore, information about the reliabilities and validities of the observed (composite) indicators is also provided by the measurement model. Diamantopoulos and Siguaw (2000) claims that the structural model fit indices can only be interpreted unambiguously for or against the comprehensive LISREL model if the indicator variables used to operationalise the latent variables accurately reflect the latent variables they were assigned to represent.

In other words, it is important to first test the measurement model, prior to fitting the comprehensive LISREL model (Theron, 2017e). Successful operationalisation of the indicator variables is indicated if the measurement model fits the data well (or closely), the factor loadings (λ_{jk}) in the Λ^{x} matrix are large and significant ($p<.05$), the error variance terms ($\theta_{\delta jj}$) in the Θ_{δ} matrix are small but significant ($p<.05$), the elements of the variance-covariance matrix Φ are not excessively large (i.e., the indicator variables succeeded in successfully discriminating between the qualitatively distinct latent variables included in the structural model), and the R^2 for indicator variables are large.

In the current study, CFA was performed in several instances. CFA was firstly performed to test each multidimensional scale (designed to measure a multidimensional latent variable). This includes the scales pertaining to *job characteristics, routes to psychological ownership, salient root needs, motivation to pursue the routes, employee creativity and entrepreneurial behaviour, accomplishing objectives* and *applying specialist expertise*. As described in paragraph 3.7.3, CFA was also performed when unanticipated factor fission was found in the case of the multidimensional scales or subscales.

CFA was also performed in order to “test the overarching substantive measurement hypothesis that the composite indicator variables earmarked to represent specific latent variables, provide valid and reliable measures of the designated latent variables” (Lee, 2017, p. 124). The last CFA thus indicated whether the *psychological ownership* structural model was validly operationalised by the measurement model (Diamantopoulos & Siguaw, 2000) through the evaluation of measurement model fit, as well as the magnitude and statistical significance of the (completely standardised) measurement model parameter estimates (Jöreskog & Sörbom, 1996.). The measurement model was fitted by testing the following exact and close fit null hypotheses:

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H_{025a}: RMSEA = 0

H_{a25a}: RMSEA > 0

H_{025b}: RMSEA $\leq$ .05

H_{a25b}: RMSEA > .05

If the exact or close fit would be found (in other words do not reject H_{025a} and H_{025b}), or if the measurement model would at least demonstrate reasonable model fit (as indicated by the basket of fit indices produced by LISREL), the following 26 null hypotheses on the slope of the regression of item parcel j on latent variable k would be tested in the Λ^x matrix (*lambda-X hypotheses*):

H_{0i}: $\lambda_{jk} = 0$; i=26, 29, …, 51; j=1, 2, …, 26; k=1, 2, …, 13

H_{ai}: $\lambda_{jk} \neq 0$; i=26, 29, ..., 51; j=1, 2, …, 26; k=1, 2, …, 13

If the exact or close fit would be found (in other words do not reject H_{025a} and H_{025b}), or if the measurement model would at least demonstrate reasonable model fit, the following 26 null hypotheses would be tested with regards to the freed elements in the variance-co-variance matrix Θ_δ (*theta-delta covariance hypotheses*):

H_{0i}: $\theta_{\delta jj} = 0$; i=52, 53, ..., 77; j=1, 2, ..., 26

H_{ai}: $\theta_{\delta jj} > 0$; i=52, 53, ..., 77; j=1, 2, ..., 26

If the exact or close fit would be found (in other words do not reject H_{025a} and H_{025b}), or if the measurement model would at least demonstrate reasonable model fit, the following 78[46] null hypotheses would be tested with regards to the freed elements in the variance-co-variance matrix Φ (*phi hypotheses*):

H_{0i}: $\phi_{jk} = 0$; i=78, 79, ..., 155; j=1, 2, ..., 13; k=1, 2, ..., 13; $j \neq k$

H_{ai}: $\phi_{jk} > 0$; i=78, 79, ..., 155; j=1, 2, ..., 13; k=1, 2, ..., 13; $j \neq k$

3.7.4.4. Interpreting the measurement model fit and parameter estimates

Model 'fit' refers to the extent to which a hypothesised model is consistent with the data (Diamantopoulos & Siguaw, 2000). Stated differently, measurement model fit refers to whether the model is able to successfully reproduce the covariance matrix of the observed data. If the reproduced covariance matrix approximates the observed covariance matrix, the

[46] [13 x (13-1)] / 2 = 78

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model is considered to have good fit (Lee, 2017). After ensuring model identification[47] and evaluating the fit, the parameter estimates can be interpreted. “Parameter estimates for the model are obtained from the data as the LISREL program attempts to generate an implied (i.e., model-based) covariance matrix that is equivalent to the observed (i.e., actual) covariance matrix” (Diamantopoulos & Siguaw, 2000, p. 8).

Diamantopoulos and Siguaw (2000) argue that any assessment of the substantive relations of interest will be problematic if there is any doubt concerning the quality of the measurement model. In other words, it will be problematic if the model’s ability to reproduce an estimate covariance matrix that approximates the observed covariance matrix is questionable, or if the parameter estimates are statistically insignificant or have inappropriate magnitudes (Du Toit & Du Toit, 2001).

Therefore, assessing the fit of the measurement model, and the statistical significance and magnitude of the parameter estimates is crucial, prior to undertaking a detailed evaluation of the structural model. Goodness of fit statistics concern the degree to which the “variance and covariance values in the observed variance and covariance matrix, predicted by the model, agree with the empirically observed variances and covariances” (Lee, 2017, p. 127). According to Diamantopoulos and Siguaw (2000), a wide range of goodness-of-fit indices have been developed over the years. These can be used as summary measures of a model’s overall fit. These scholars highlight that none of them are considered superior to the rest.

Consequently, the measurement model fit was interpreted by testing H_{025a} and H_{025b}, and by interpreting the full array of fit indices provided by LISREL. The quality of the model fit was also evaluated by interpreting the distribution and magnitude of the standardised residuals, as well as the model modification indices calculated for $\boldsymbol{\Lambda^x}$, $\boldsymbol{\Theta_\delta}$ and $\boldsymbol{\Phi}$. Large modification index values indicated measurement model parameters that, if set free, would improve the fit of the model.

Since the measurement model obtained close fit (i.e., did not reject H_{025b}), the measurement model parameters were interpreted by testing H_{026} - H_{0155}. The magnitude of the statistically significant ($p<.05$) parameter estimates for which H_{0i}; i= 26, 27, …, 155 were rejected, were interpreted from the completely standardised solution[48]. Factor loadings were considered

[47] The measurement model and comprehensive LISREL model can only be fitted (i.e., estimates of the freed model parameters can be estimated) if the model is over-identified. A model is over-identified if the number of unique terms in the observed variance-covariance matrix exceeds the number of unknown freed parameters in the model that need to be estimated.

[48] The completely standardised solution reports the parameter estimates obtained when both the latent variables and the indicator variables have been standardised to have a mean of zero and a standard deviation of one.

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acceptable in the completely standardised solution if $\lambda_{jk} \geq .71$. Completely standardised measurement error variances were considered acceptable if $\theta_{\delta jj} \leq .50$. Latent variable inter-correlations were considered acceptable if $\phi_{jk} \leq .90$ and the 95% confidence intervals for ϕ_{jk} did not include unity (Hair *et al.,* 2010). Since the measurement model showed close fit and the parameter estimates were statistically significant ($p<.05$) and of satisfactory magnitude, the structural model was tested by fitting the comprehensive LISREL model.

3.7.4.5. Testing the structural model by fitting the comprehensive LISREL model

Diamantopoulos and Siguaw (2000, p. 5) suggest that the structural model "describes the relationships between latent variables themselves and indicates the amount of unexplained variance." The structural model on its own cannot be fitted. Only the measurement model and the comprehensive LISREL model (as a combination of the measurement model and the structural model) can be fitted to empirical data. The fit of the structural model has to be inferred from the fit of the measurement and comprehensive LISREL models. It is important to acknowledge the fact that if the hypothesised model were to fit well, it only offers one possible plausible answer to the research-initiating question, as another model may fit similarly well (MacCallum & Austin, 2000). It therefore simply presents a permissible explanation for the observed covariance matrix (Lee, 2017).

Hair *et al*. (2010) suggest that fitting the comprehensive LISREL model involves evaluating the validity of the overarching statistical hypothesis and path-specific hypotheses by determining whether the estimated covariance matrix corresponds to the observed sample covariance matrix. Assessing the comprehensive LISREL model fit via a variety of goodness-of-fit statistics is considered good practice (Diamantopoulos & Siguaw, 2000). The quality of the model fit is firstly assessed by testing H_{01a} and H_{01b}. It is then further assessed by examining the magnitude and distributions of the standardised variance-covariance residuals and the model modification indices. This includes the modification indices calculated for the relationships between the exogenous and endogenous variables ($\boldsymbol{\Gamma}$), the relationships between the endogenous variables ($\mathbf{B}$), and the covariances among the endogenous disturbances ($\boldsymbol{\Psi}$) (Diamantopoulos & Siguaw, 2000). Determining whether the theoretical relationships specified in the research are supported by the data was the ultimate aim of this process. Lastly, interpretation of the structural model parameter estimates was considered permissible if the comprehensive model showed close fit (i.e., H_{01b} was not rejected) or at least reasonable model fit was obtained as judged by the array of fit statistics.

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3.7.4.6. Interpreting the structural model and parameter estimates

When evaluating the parameter estimates, it is firstly important to determine whether the signs of the parameters that represent the paths between the latent variables, are in agreement with the nature of the causal effects hypothesised to exist between the latent variables (negative or positive) under H_a (Lee, 2017). Secondly, it is also important to determine whether the parameter estimates are statistically significant ($p<.05$). The statistical significance of the structural model parameter estimates were evaluated by testing H_{02} to H_{024}. Once the parameter estimates were found to be statistically significant, the magnitude of the parameter estimates, which show the strength of the hypothesised relationship, were evaluated via the completely standardised solution. Additionally, the squared multiple correlations (R^2), which indicate the amount of variance in each endogenous latent variables accounted for by the model, were also assessed. Larger R^2 values were considered desirable, due to the fact that the higher the squared multiple correlations, the greater the joint explanatory power of the hypothesised antecedents.

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CHAPTER 4

EVALUATION OF ETHICAL RISKS

4.1. INTRODUCTION

Prior to conducting research, it is important that due thought be given to any potential ethical pitfalls that could arise. During the research process, these ethical issues generally arise from the researcher's interaction with participants (Babbie & Mouton, 2010). These issues include aspects such as accountability, informed consent, confidentiality, voluntary participation, anonymity, responsibility and responsiveness, plagiarism and ethical reporting. While conducting research, the ultimate aim of upholding ethical standards is to protect participants. Since active or passive involvement of people is required in empirical behavioural research, it is important that the rights, safety, interests, privacy, dignity and well-being of the research participants are considered and protected. It is important to determine whether these aspects of participants will be compromised to some degree and whether the purpose of the research study can justify this compromise.

Sound ethical practices in the social sciences lay the foundation for better quality research, protect the research participants and ensure compliance with relevant legislation. By considering and outlining ethical risks associated with the study, it ensures that the research adheres to rigorous ethical and moral requirements. The purpose of this chapter is therefore to outline ethical aspects, risks and standards related to the current research study.

4.2. ETHICAL STANDARDS AND CONSIDERATIONS

Lowman (1998) suggests that there are at least four basic requirements when conducting research. Firstly, no (unjustifiable) harm should come to an individual as a result of his/her participation in a research study. Secondly, the participant should be fully informed of any potential consequences of his/her participation (informed consent). Thirdly, invitees and participants should be aware of the fact that their participation is voluntary. Fourthly, all reasonable measures should be taken in order to ensure the confidentiality and anonymity of the data collected are maintained. Furthermore, The South African Psychological Association (PsySSA) (1992) has a code of ethics that must be honoured by all PsySSA members who conduct research. This code of ethics was created in order to avoid the possibility of having research conducted by unqualified people and to ensure the protection of rights of subjects (Muchinsky, Kriek & Schreuder, 2002).

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In Annexure 12 of the Ethical Rules of Conduct for Practitioners registered under the Health Professions Act (Act no. 56 of 1974) (Republic of South Africa, 2006, p. 41) it states the following:

> 86. A psychologist shall plan and conduct research in a manner consistent with the law, and with internationally acceptable standards for the conduct of research, in particular those national and international standards for research with human participants and animal subjects.

This places the responsibility on the researcher to not only conduct research in accordance with national and international ethical standards for the conduct of research, but also to be familiar with the legal aspects pertaining to the research study and how to ensure compliance throughout the research process. Aspects concerning institutional approval, informed consent, voluntary participation, anonymity and confidentiality could potentially cause concern and will therefore be discussed briefly.

An important consideration, according to Annexure 12 of the Ethical Rules of Conduct for Practitioners (Republic of South Africa, 2006, p. 41) is institutional approval. A psychological researcher should obtain institutional permission from the organisation from which research participants will be solicited:

> 87. A psychologist shall –
>
> (a) obtain written approval from the host institution or organisation concerned prior to conducting research;
>
> (b) provide the host institution or organisation with accurate information about his or her research proposal; and
>
> (c) conduct research in accordance with the research protocol approved by the institution or organisation concerned.

Since the current study requires participation from employees in different organisations, informed institutional permission was therefore required before any data could be collected from employees. The formal institutional permission letter that was sent to the various organisations is provided in Appendix A. The approved letters were submitted to the Stellenbosch Research Ethics Committee (REC) for Human Research (Humanities).

The Ethical Rules of Conduct for Practitioners (Republic of South Africa, 2006) states that a psychologist doing research is required to enter into an agreement with participants on the nature of the research, and the responsibilities of each party (participant and researcher). According to Annexure 12 (Republic of South Africa, 2006, p. 42), the agreement, in terms of which the research participant provides informed consent, should meet the following requirements:

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89. (1) A psychologist shall use language that is reasonably understandable to the research participant concerned in obtaining his or her informed consent.

(2) Informed consent referred to in subrule (1) shall be appropriately documented, and in obtaining such consent the psychologist shall –

(a) inform the participant of the nature of the research;

(b) inform the participant that he or she is free to participate or decline to participate in or to withdraw from the research;

(c) explain the foreseeable consequences of declining or withdrawing;

(d) inform the participant of significant factors that may be expected to influence his or her willingness to participate (such as risks, discomfort, adverse effects or exceptions to the requirement of confidentiality);

(e) explain any other matters about which the participant enquires;

(f) when conducting research with a research participant such as a student or subordinate, take special care to protect such participant from the adverse consequences of declining or withdrawing from participation;

(g) when research participation is a course requirement or opportunity for extra credit, give a participant the choice of equitable alternative activities;

(h) in the case of a person who is legally incapable of giving informed consent, nevertheless –

(i) provide an appropriate explanation;

(ii) obtain the participants assent; and

(iii) obtain appropriate permission from a person legally authorized to give such permission.

Each research participant had the right to voluntarily decide whether he/she wanted to accept the invitation to participate in the research study, or not. In order to have made an informed decision, however, the invitee was informed of several aspects regarding the research. This included the purpose and objective of the research, who the researchers are, what participation would involve, how the results would be disseminated and used, what his/her rights were as a participant, where and how he/she could make further enquiries about the research (should he/she wish to do so), and where he/she could obtain further information on his/her research rights (Stellenbosch University, 2012). A copy of the informed consent for participation in the research can be found in Appendix D.

When participating in any form of research, a certain level of stress is produced within participants. Since the researcher is obligated to protect participants from any harm, the researcher attempted to remove any “undesirable consequences of participation” (Kerlinger & Lee, 2000, p. 445). Prior to the commencement of the data collection, information was provided regarding the credentials of the researcher, objectives and purpose of the study,

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how to withdraw from the study and how confidentiality and anonymity would be maintained. The confidentiality and anonymity rights of the participants were protected at all costs by the researcher. Measures were also implemented to protect the confidentiality of results by means of a password protected computer and login details to the online Stellenbosch University internet-based e-Survey service (Sunsurveys) that only the researcher could access.

Since the study pertained to the organisational context, it was especially important to clarify aspects regarding the format and dissemination of results. This is due to the fact that the participants (employees) may have fears regarding persecution or a potential conflict of interest between the organisation, researcher and employee. It was therefore critical to clarify to the participants that no such a conflict of interest existed and that the results obtained would not pose any harm to their current position or job.

With regards to disclosure of confidential information, Annexure 12 of the Ethical Rules of Conduct for Practitioners (Republic of South Africa, 2006, p. 25) requires psychological researchers to disclose confidential information under the following circumstances:

> 27. (1) A psychologist may disclose confidential information –
>
> (a) only with the permission of the client concerned;
>
> (b) when permitted by law to do so for a legitimate purpose, such as providing a client with the professional services required;
>
> (c) to appropriate professionals and then for strictly professional purposes only;
>
> (d) to protect a client or other persons from harm; or
>
> (e) to obtain payment for a psychological service, in which instance disclosure is limited to the minimum necessary to achieve that purpose.
>
> (2) When required to do so by law or a court of law, a psychologist shall disclose the confidential information so required.

The data collected in the current study was kept confidential, and the results were only presented in aggregate form. Participants were not be able to receive feedback on their results obtained from the study due to the anonymity of the data capturing procedure. Moreover, the study did not involve the assessment of critical latent variables, where obtaining an unusually low or high score could have posed a serious threat to the well-being of research participants.

In addition to collecting data from employees employed at institutions (that granted institutional permission), two internet-based social media platforms, namely Facebook and LinkedIn, were used to distribute the link to the Psychological Ownership Questionnaire.

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The researcher therefore undertook an in-depth investigation regarding ethics, rights and responsibilities when using the internet, and specifically these platforms, as a means to connect with and collect data from participants. Several authors (Hoerger & Currell, 2012; Markham & Buchanan, 2015) provide discussions on research ethics for internet-based research. The communalities outlined and best practices (e.g. institutional permission, informed consent, voluntary participation, showing respect for persons, maintaining confidentiality, and anonymity of responses) were all adhered to in the current study.

After the Cambridge Analytica data breach scandal in 2018, Facebook updated their Terms of Service and Data Policy, mainly to protect their corporate identity and rights, and to increase their own transparency as a platform with access to mass personal data. Although these changes may impact individuals using the platform for commercial and advertising purposes, it does not extend to data that would be collected on a third party website (such as Sunsurveys) for a research study. After extensive research regarding any policy documents relating to the use of Facebook as a platform to access research participants, only the following information was obtained in Facebook's *Statements of Rights and Responsibilities* (Facebook, 2018):

> **Protecting Other People's Rights**
> We respect other people's rights, and expect you to do the same.
>
> - If you collect information from users, you will: obtain their consent, make it clear you (and not Facebook) are the one collecting their information, and post a privacy policy explaining what information you collect and how you will use it.
> - You will not post anyone's identification documents or sensitive financial information on Facebook.
> - You will not tag users or send email invitations to non-users without their consent. Facebook offers social reporting tools to enable users to provide feedback about tagging.

The informed consent corresponded to the aforementioned prerequisites. More specifically, it stated that the researcher, as a student and representative of Stellenbosch University, and not Facebook, will be collecting the anonymous data. It also stated the nature of the information obtained and how it will be used and disseminated. In addition to this, the researcher did not tag individuals or send emails to any users or non-users regarding the research, without their consent. The researcher did not obtain any names, identification numbers, sensitive (financial) information, or other personal information from any of the research participants (i.e., Facebook 'friends' and their 'friends', and LinkedIn contacts and their contacts). Furthermore, when the questionnaire post was shared by a Facebook 'friend'

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or LinkedIn contact, the ‘friend’ or ‘contact’ was required to share the message verbatim in order to ensure that potential participants know their rights.

The only information that was found on LinkedIn concerning data collection for a research study was related to the new European Union General Data Protection Regulation 2016/672. It obligates companies to implement control tools and specific procedures for management and protection of all data of their customers and collaborators. However, no further information specifically related to data collection for a thesis was found.

The use of Facebook and LinkedIn, as internet-based social media platforms to connect with potential participants, did not in any way place the data of participants at risk. The reason for this is that once an individual was interested in voluntarily completing the questionnaire, they were redirected to Sunsurveys, a separate and secure third-party site where the data was collected. Therefore, neither the researcher nor Facebook had access to the identities of the research participants.

The final critical consideration for this study was whether the cost that research participants had to incur balanced the benefits that accrue to society (Stellenbosch University, 2012). As discussed in Chapter 1, the aim of the study was to contribute to the accumulation of knowledge to properly uncover and understand the nomological network of latent variables that regulate the level of the *psychological ownership* experienced by employees, and how this influences *performance*. Therefore, this research study enabled the researcher to investigate *job-based* and *organisation-based psychological ownership*, how these influence beneficial work-related outcomes, and how these feelings of ownership can be leveraged within the workplace to benefit employees and the organisation. It could be argued, moreover, that through the contribution to the body of knowledge regarding *psychological ownership* and the performance of working man, this study possesses an element of social value.

This study was classified as a low risk project that poses no harm to participants during the course of, or after participation. The application for ethical clearance of this research study was submitted to the Departmental Ethics Screening Committee (DESC) and the Research Ethics Committee (REC) for Human Research (Humanities) of Stellenbosch University. Ethical clearance for this study was granted by REC: Humanities on 13 February 2019 (Appendix E).

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CHAPTER 5

RESEARCH RESULTS

5.1. INTRODUCTION

In an attempt to answer the overarching and more specific research-initiating questions that drive this research study, a second-generation explanatory *psychological ownership* structural model was developed and presented in Figure 2.3. Grounded on extensive theorising, an overarching substantive research hypothesis and 23 path-specific substantive research hypotheses were proposed. In Chapter 3 the research methodology used to evaluate the validity of the proposed research hypotheses and *psychological ownership* structural model was outlined. The purpose of this chapter is therefore to present and examine the research results obtained from the statistical analyses that were performed based on the methodology described in Chapter 3.

More specifically, this chapter briefly outlines the data collection procedure and describes the demographic characteristics of the sample group, the treatment of missing values, and the psychometric properties of the measurement instruments via item analysis and dimensionality analysis. In order to determine the psychometric integrity of the indicator variables, an analysis of the measurement model is conducted, which is followed by an evaluation of the structural model fit and the parameter estimates.

5.2. SAMPLE GROUP DEMOGRAPHIC CHARACTERISTICS

As described in Chapter 3, a non-probability, convenience sampling method was used. Participants were recruited via Facebook and LinkedIn, while others employed at five organisations that operate within different industries (consulting and business services, engineering, transport and logistics, and retail and consumer) were invited via email. The winner of the Psychological Ownership lucky draw was identified by using an algorithm for random selection in Microsoft Excel. The random number that was generated corresponded to the cell phone number ending in xxx-xxx-2090, and the winner was awarded with a two day voucher at Nedile Lodge.

After cleaning the data, the final sample comprised of 340 employees with a rather diverse demographic profile. The data cleaning entailed the removal of several responses that were problematic. Since the data collection system provided information about the total survey completion time, five responses that were completed under six minutes were removed as this would not have provided adequate time to properly read, intellectually engage with, and

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respond to the posed questions. Furthermore, a few responses that coded problematically were also removed from the sample. More specifically, these were cases where responses coded with inadmissible values (e.g. 1.5 and 3.5). The final sample size of 340 exceeded the sampling target set in Chapter 3.

Table 5.1 provides a summary of the sample group's gender, race, age and country of residence. It indicates that more females (67.9%) than males (32.1%) completed the survey and that 78.2% of the respondents were White. Nevertheless, Black, Coloured and Indian groups were also represented. Half of the respondents fell in the age category of 21 to 25 years, with the second largest group being the age category of 26 to 29. It also appears that most of the respondents were South African, however, USA, Europe (Finland, Belgium, Germany, Austria) and four other countries were also represented.

Table 5.1

Demographic Characteristics of the Sample

Description	Frequency	Percent
Gender		
Male	109	32.1%
Female	231	67.9%
Race		
Black	36	10.6%
Coloured	10	2.9%
Indian	26	7.6%
White	266	78.2%
Other	2	.6%
Age		
21-25	173	50.9%
26-29	83	24.4%
30-34	25	7.4%
35-39	9	2.6%
40-50	23	6.8%
51-60	21	6.2%
61-70	6	1.8%
Country		
RSA	317	93.2%
USA	12	3.5%
Europe	4	1.2%
Namibia	2	.6%
China	2	.6%
Canada	2	.6%
Australia	1	.3%

Table 5.2 provides a summary of the highest educational qualification, industry, job level and tenure of the sample group. It is evident that most respondents indicated that they have

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a tertiary qualification, with a total of 13.5% and 2.6% holding a Master's and Doctorate degree, respectively.

Table 5.2

Work-related Sample Characteristics

Description	Frequency	Percent
Qualification		
Matric	15	4.4%
Diploma or certificate	22	6.5%
Undergraduate degree	102	30.0%
Postgraduate diploma	14	4.1%
Honour's degree	128	37.6%
Master's degree	46	13.5%
Doctorate	9	2.6%
Other	4	1.2%
Industry		
Agriculture and agribusiness	12	3.5%
Communications – Media/Marketing/Advertising/PR	17	5%
Construction	8	2.4%
Consulting and business services	98	28.5%
Education	26	7.6%
Engineering	14	4.1%
Finance	47	13.8%
Government and public services	2	.6%
Healthcare and health/fitness	25	7.4%
Industrial psychology and human resources	7	2.06%
Information technology	5	1.5%
Mining and manufacturing	4	1.2%
Retail and consumer	12	3.5%
Tourism	1	.3%
Transport and logistics	6	1.8%
I work across industries	19	5.6%
Other	38	11.18%
Job level		
Entry level	175	51.5%
Junior management	48	14.1%
Middle management	57	16.8%
Senior management	40	11.8%
Other	20	5.9%
Tenure		
Less than 1 year	124	36.5%
1-2 years	107	31.5%
3-5 years	62	18.2%
6-10 years	27	7.9%
11-20 years	10	2.9%
21+ years	10	2.9%

The sample group was spread across a wide range of industries, with the largest group (28.5%) employed in consulting and business services and 5.6% working across industries. "Other" industries included auditing, aviation, banking, cosmetics, diplomatic mission,

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energy industry, environmental services, FMCG (fast moving consumer goods), forensic services, fragrance industry, insurance, law and labour law, mental health counselling, music, motor sales, real estate investment, restaurant (food and beverage), social work, steel industry, and speech and language therapy.

It is also evident that half of the sample group were employed in entry level jobs, while the rest were in either junior, middle or senior managerial positions. 'Other' job levels included associate professor, commercial pilot, community service medical officer, charter pilot, junior advocate, self-employed, and a senior sales executive. Lastly, most respondents have been in their current job for up to one (36.5%) or two years (31.5%). As mentioned, the target population for the current study included all full-time employees, with different demographic profiles, levels of skill, employed at any type of organisation, in any country. Although a non-ignorable sampling gap is acknowledged and the method of sampling also precluded any claim of representativeness, it was nonetheless concluded that the sample group was sufficient in terms of size, relevance and diversity to warrant further analyses.

5.3. MISSING VALUES

The online platform that was used for data collection had the option of setting questions to an 'answer is required' format, which meant that in order for participants to progress to the following question, an answer had to be provided. This setting was implemented for all questions on the Psychological Ownership Questionnaire. In other words, participants were forced to provide an answer to each and every question posed, including the questions related to demographic information. Additionally, the Likert scale responses included either an 'Uncertain', 'Neutral' or 'Unsure' option. This mitigated the problem of respondents being unable to respond meaningfully when they were uncertain about a particular question. Consequently, the latter two aspects ensured that there were no missing values to be dealt with in the current research study[49].

5.4. PSYCHOMETRIC EVALUATION OF THE MEASUREMENT INSTRUMENTS

Before one can confidently derive valid inferences from the data collected, the psychometric properties of the 11 measurement instruments had to be investigated. The extent to which these instruments provide an adequate measure of the specific latent variables they were designed to measure centers around two related aspects, namely reliability and validity

[49] If provision for an 'unable to respond' response option (as outlined in Chapter 3) would have been made, such responses would have had to be coded as missing values. The positioning of the 'Uncertain', 'Neutral' or 'Unsure' response options, in the middle of the response scale, meant that the selection of one of these response options indicated a standing on the latent variable that can be described as neither high or low. Such responses were therefore not treated as user-defined missing values.

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(Murphy & Davidshofer, 2014). In order to evaluate the reliability and validity of the instruments, each scale and subscale was subjected to an item analysis and a factor analysis.

The purpose of item analysis is to evaluate each item to see whether it serves the purpose for which it was designed (Foxcroft & Roodt, 2013). It was therefore used to identify poor items that failed to reflect the focal underlying common latent variable or that failed to discriminate between relatively small differences in the level of the focal latent variable. Using SPSS 25, the item analysis was performed per unidimensional scale or unidimensional subscale.

The Cronbach alpha[50] and a number of relevant item statistics (i.e., item means, item standard deviations, inter-item correlations, item-total correlations, squared multiple correlation, the change in the scale mean, scale variance and Cronbach's alpha if an item would be deleted) were obtained and interpreted. In line with the European Federation of Psychologists' Association (EFPA) guidelines (Evers, Muñiz, Hagemeister, HstmæLingen, Lindley, Sjöberg & Bartram, 2013), a Cronbach alpha of .80 was considered to be satisfactory for internal consistency. Furthermore, a guideline proposed by Guilford was adopted for the interpretation of inter-item correlation coefficients (Tredoux & Durrheim, 2002, p. 184). More specifically, correlations were interpreted as being low (.20 to .39; definite but small relationship), moderate (.40 to .69; substantial relationship) or high (.70 to .89; strong relationship). Decisions regarding the deletion of problematic items were based on the evaluation of a basket of item statistic evidence.

Furthermore, factor analysis was conducted in order to examine the assumption that the items within a subscale or scale, representing the latent variables of interests, are unidimensional. As explained in Chapter 3, EFA is generally used to uncover the optimum factor structure underlying data (Moerdyk, 2012), whereas with CFA, one takes a specific hypothesised structure and sees how well it accounts for the observed relationships in the data (Loehlin & Beaujean, 2017). Nevertheless, in the current study EFA was used to evaluate the unidimensionality of each scale and subscale. Principal axis factor analysis (with oblique rotation) was the method used for extracting factors from the correlation matrix.

[50] Although coefficient alpha (α) is a more popular estimate of test reliability, it is based on several stringent assumptions that are seldom met in empirical data (Trizano-Hermosilla & Alvarado, 2016). It is acknowledged that Cronbach's alpha should only actually be interpreted if the assumptions of unidimensionality, uncorrelated measurement errors and item tau-equivalent (i.e., equal unstandardised factor loadings for all the items on a single underlying factor or the items measure the factor or latent trait of interest with equal sensitivity) are met. Since only the first two assumptions apply to coefficient omega (ω), it has been suggested as a more appropriate reliability coefficient. However, if the items are relatively uniform in size and at least moderately strong (factor loadings are >.60), then alpha and omega will be relatively similar (omega often being slightly higher) (De Bruin, 2018).

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A scale or subscale was considered factor analysable if the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy approached unity (>.60) and Bartlett's null hypothesis, which states that the correlation matrix in the parameter is an identity matrix, was rejected. The unidimensionality assumption was met if the factor loadings on the single extracted factor were larger than .50 ($\lambda_{j1} \geq .50$), and a relatively small percentage (less than 30%) of the residual correlations were larger than .05.

Using LISREL 8.8, CFA was conducted on the multidimensional scales and on the scales where factor fission occurred during EFA. As explained in Chapter 3, in the instance of factor fission, a first-order measurement model, reflecting the loading pattern in the pattern matrix, and a second-order measurement model, in which the two (or more) extracted factors loaded on a single second-order factor was fitted to the data. If the second-order measurement model fitted closely, and the indirect effects of the second-order factor on the subscale items were evaluated as statistically significant ($p<.05$), it was concluded that the items of the subscale may be regarded as valid indicators of the second-order factor underpinning the subscale. In the situation where the first-order measurement model did not obtain acceptable fit, and the modification indices[51] for the off-diagonal of the measurement error variance-covariance matrix were statistically significant ($p<.01$), a bifactor model was fitted.

As explained by Loehlin and Beaujean (2017, pp. 230-231):

> In a bi-factor model structure, each original variable can be explained by a general factor, a group factor that is orthogonal to the general factor, and a residual. Thus, each variable in the pattern matrix has two loadings – one on the general factor and one on a group factor.

If close fit was obtained for the bi-factor model and the items statistically significantly[52] ($p<.05$) loaded on the general factor and/or the narrower group factor they were designated to reflect, and at least 25% of the variance in each item could be explained by the two factors linked to it, then the items of the subscale were regarded as valid indicators of the multidimensional construct.

The CFA conducted on the multidimensional scales (*job characteristics, routes to psychological ownership, salient root needs, motivation to pursue the routes, employee creativity and entrepreneurial behaviour, accomplishing objectives* and *applying specialist*

[51] Diamantopoulos and Siguaw (2000, p. 8) suggest that "modification indices larger than 3.84 are considered to be 'large' (since 3.84 is the critical value of the chi-square statistic, with 1 degree of freedom at the 5% significance level)." For the current study, modification indices larger than 6.6449 were considered 'large' at the 1% significance level.

[52] A critical value of 1.96 was used to evaluate the statistical significance of the factor loading estimates due to the non-directional nature of the hypotheses.

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expertise) followed the same steps as outlined above. However, measurement model fit in these analyses referred to the quality of the operationalisation of the multidimensional scales (designed to measure a multidimensional latent variable). It would thus imply construct validity and support for the claim that an instrument measured the construct as constitutively defined in the manner intended.

The results of the item analyses and dimensionality analyses are outlined in following section. The results of the multidimensional scales are presented in a consolidated fashion to improve coherence and avoid redundancy.

5.4.1. Job characteristics

The five *job characteristics,* namely *autonomy, task identity, skill variety, task significance* and *feedback* were measured with sections one and two of the JDS-R by Idaszak and Drasgow (1987), which consisted of 15 items. Although a degree of correlation between the subscales could be expected, each subscale was designed to measure a qualitatively distinct latent variable.

5.4.1.1. Job characteristics item analysis

The item analysis results of the *autonomy, task identity, skill variety, task significance* and *feedback* subscales are summarised and presented in Table 5.3.

Table 5.3

Job Characteristics Item Analysis Results

Subscale	Cronbach's alpha	Scale mean	Scale variance	Scale std. deviation	Average inter-item correlation	Items flagged	N of items
Autonomy	.803	15.3618	14.273	3.77795	.569	Auton1	3
Task identity	.797	15.0441	17.564	17.564	.565	Taskid1	3
Skill variety	.773	16.4941	13.189	3.63163	.527	Skillv1	3
Task significance	.785	16.3941	15.119	3.88826	.547	Signif1	3
Feedback	.793	14.8971	15.721	3.96496	.560	Feedb1	3

All of the *job characteristics* subscales, except *autonomy*, obtained alpha coefficients slightly below the critical cut-off value of .80. The absence of extreme means (on the 7-point Likert scale) and small standard deviations for each of the subscales' items suggested that the 15 *job characteristics* items were able to successfully discriminate between individuals that differ on the various latent subdimension.

However, item one of all five subscales (Auton1, Taskid1, Skillv1, Signif1 and Feedb1) were flagged as problematic items. Auton1 (.294), Taskid1 (.286), Skillv1 (.142), Signif1 (.253) and Feedb1 (.290) appeared to be outliers in the distribution of squared multiple correlations

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relative to the other items in each subscale. Skillv1, in particular, also appeared to be an outlier in the distribution of corrected item-total correlations (.373). The other four flagged items also had lower corrected item-total correlations, but to a slight lesser degree. Nevertheless, the variance in these five flagged items originated from a different source of variance than that which underpinned the remaining items of each subscale. The inter-item correlations corroborated the latter finding in that these five items appeared to consistently correlate lower with the remaining items in each of their subscales than the average inter-item correlations, which ranged from .547 to .569. Additionally, the deletion of Auton1, Taskid1, Skillv1, Signif1 and Feedb1 would have increased the reliability of the *autonomy* (.872), *task identity* (.829), *skill variety* (.924), *task significance* (.836) and *feedback* (.820) subscale. However, due to the limited number of items in each subscale and the fact these outliers weren't extreme, it was decided to retain all 15 items.

5.4.1.2. Job characteristics dimensionality analysis

Despite some flagged and problematic items highlighted in the item analysis, dimensionality analysis was conducted on all 15 items included in the *job characteristics* scale, per subscale. In other words, in order to evaluate the unidimensionality assumption of the five subscales, EFA was conducted on each subscale[53] independently. This was followed by CFA on the *job characteristics* scale as a whole. Table 5.4 provides a summary of the EFA results obtained for each subscale.

Table 5.4

EFA Results for the Job Characteristics Subscales

Subscale	KMO	Bartlett's Test	Factors extracted	Min factor loading	Max factor loading	Percentage large residuals[a]
Autonomy	.599	427.456 (p<.05)	1	.730	.928	66%
Task identity	.670	345.525 (p<.05)	1	.587	.854	0%
Skill variety	.576	510.089 (p<.05)	1	.387	.965	0%
Task significance	.647	343.584 (p<.05)	1	.543	.899	0%
Feedback	.666	339.070 (p<.05)	1	.588	.882	0%

a. Percentage of nonredundant residuals (>.05) computed between the observed and reproduced correlations

When conducting principal axis factor analysis on the *autonomy* subscale, the communality of an item exceeded one and factor extraction was terminated. After an unsuccessful attempt of increasing the iterations from 25 to 500, principal component analysis was conducted on the *autonomy* subscale, which returned the results reported in Table 5.4.

[53] Since each of these subscales merely include three items, it is acknowledged that performing an EFA on each subscale individually could be regarded as somewhat contentious (Chapman & Elliot, 2017; Raubenheimer, 2004). As mentioned, the design intention of the *job characteristics* scale was that the three items included in each subscale should reflect a single underlying latent variable. It was therefore decided to investigate the unidimensionality of each subscale individually.

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Each subscale's correlation matrix revealed that all the correlations exceeded .30 and all the inter-item correlations were statistically significant ($p<.05$). With the exception of the *autonomy* and *skill variety* subscales, the KMO values reported were above .60. Moreover, the identity matrix null hypothesis (which implies that each item measures a unique underlying factor) tested by the Bartlett Test of Sphericity was rejected for all of the subscales, confirming that the subscales were factor analysable.

In each subscale's case, only one factor obtained an eigenvalue larger than one and the scree plot suggested the extraction of a single factor, supporting the unidimensionality assumption of each subscale. Table 5.4 indicates that, in line with the item analysis results earlier, item one of the *skill variety* subscale (Skillv1) returned a slightly lower factor loading (.387) than the cut-off of .50. Nevertheless, the remaining items in each subscale loaded satisfactory onto a single factor. Furthermore, for all but *autonomy* (66%), there were no residual correlations that were larger than .05, suggesting that the extracted solutions provided a highly credible explanation for the observed correlation matrices. Although the high percentage returned by *autonomy* is most likely indicative of factor fission, an EFA (with two factors) and CFA was not performed on the subscale due to its small size. Overall, the evidence supported the unidimensionality assumption for the *task identity, skill variety, task significance* and *feedback* subscales, which warranted a CFA on the *job characteristics* scale.

5.4.1.3. Job characteristics confirmatory factor analysis

The null hypothesis that the item distribution follows a multivariate normal distribution had to be rejected (χ^2= 1242.493; $p<.05$). An attempt at normalising the data using PRELIS improved the symmetry and kurtosis of the multivariate indicator variable distribution (χ^2= 447.401; $p<.05$), however, multivariate normality was still not achieved. Consequently, robust maximum likelihood (RML) estimation was used for analysing the normalised data.

The first-order measurement model fitted the data poorly in that the null hypothesis of exact fit, measured by the Satorra-Bentler scaled chi-square (χ^2= 310.80; $p<.05$), and close fit (RMSEA=.092) had to be rejected ($p<.05$). In other words, it was permissible to conclude that this model displayed poor fit in the parameter. Inspection of the modification indices for theta-delta (Θ_δ) indicated a large number of constrained/fixed parameter estimates that, if set free, would improve the fit of the model. Figure 5.1 provides a visual representation of the statistically significant ($p<.01$) modification indices for the first-order *job characteristics* measurement model.

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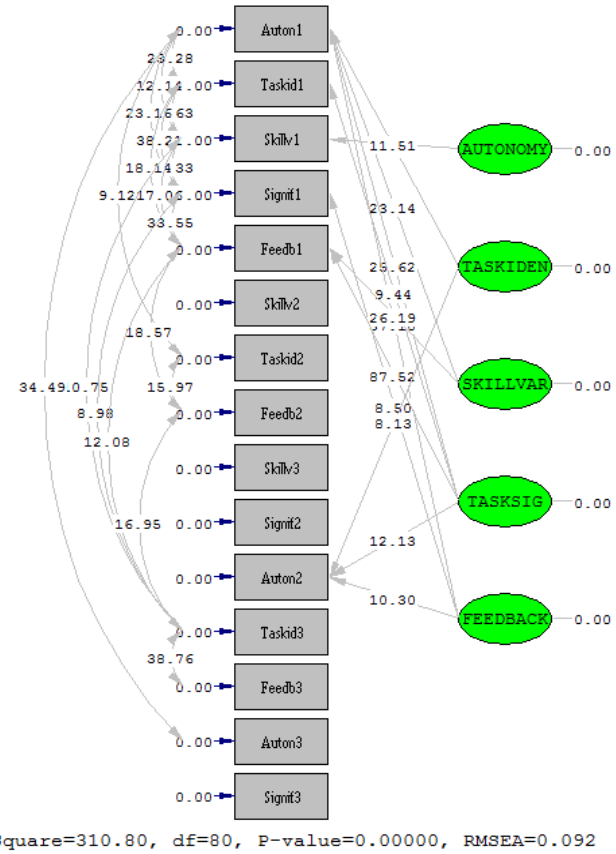

Figure 5.1. **Modification indices for the job characteristics measurement model**

More specifically, 20 of the 105 modification indices calculated for the fixed covariances (20/105[54]= 19%) were statistically significantly (p<.01). This suggested that a common source of systematic variance underpinning the items of the *job characteristics* scale may have been omitted (e.g., a general factor). A bi-factor model was then fitted to the data in the hope that it would provide a more plausible explanation for the observed inter-item covariance matrix.

According to the Satorra-Bentler chi-square statistic, the exact fit null hypothesis had to be rejected (χ^2= 108.06; p<.05) and the model did not display exact fit in the parameter. However, the close fit null hypothesis was not rejected (RMSEA=.044; p>.05), which provided evidence of good fit for the *job characteristics* bi-factor measurement model. This warranted the interpretation of some of the measurement model parameter estimates.

The unstandardised lambda-X matrix (which represents the slope of the regression of the items on the latent variables) indicated that all the items loaded statistically significantly (p<.05) on the narrow, more specific factor that they were tasked to reflect. With the exception of Taskid1, Skillv1 and Feedb1, the items also loaded statistically significantly (p<.05) on the broad, general factor. With the exception of Skillv1 that obtained a R^2 value

[54] [p x (p-1)] / 2 = [15 x (15-1)] / 2 = 105. Where p equals the number of items in the scale.

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of .239, all of the other values were above .50 (ranging from .501 to .872). This provides evidence that at least 25% or more of the variance in each item could be explained by the two factors linked to it. A visual representation of the *job characteristics* bi-factor measurement model is provided in Figure 5.2.

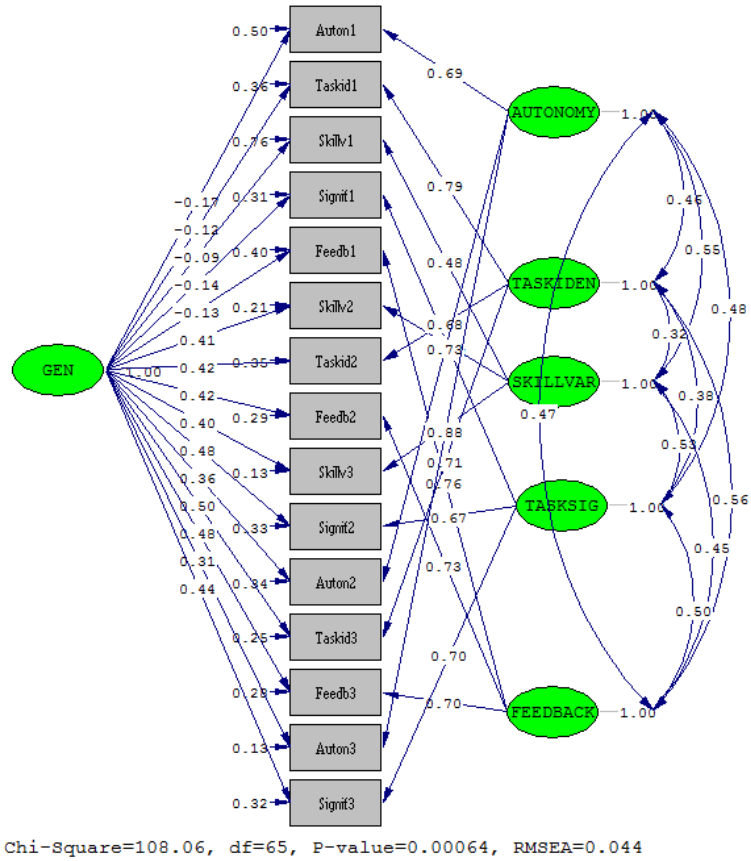

Figure 5.2. **Job characteristics bi-factor measurement model (completely standardised solution)**

It is therefore permissible to conclude that the operationalisation of the *job characteristics* construct was largely successful and that the scale can be considered a construct valid measure. The following section describes the psychometric evaluation of the instruments used to measure the *routes to psychological ownership.*

5.4.2. Routes to psychological ownership

The *routes to psychological ownership*, namely *self-investment, intimate knowledge* and *control of the job* were measured with 14 items developed and adapted by Brown *et al.* (2014).

5.4.2.1. Routes to psychological ownership item analysis

The results of the item analysis of the *self-investment, intimate knowledge* and *control of the job* and subscales are outlined in a summarised fashion in Table 5.5.

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Table 5.5

Routes to Psychological Ownership Item Analysis Results

Subscale	Cronbach's alpha	Scale mean	Scale variance	Scale std. deviation	Average inter-item correlation	Items flagged	N of items
Self-investment	.859	23.0588	19.519	4.41799	.615	-	4
Intimate knowledge	.900	23.0000	16.909	4.11200	.692	-	4
Control	.894	26.2441	62.592	7.91152	.588	Control1	6

All three subscales obtained above satisfactory alpha coefficients (.859 to .900). None of the subscales' items obtained extreme means or small standard deviations, which indicated an absence of poor, insensitive items. With the exception of Control1, no outliers were evident towards the lower end of the squared multiple correlation and corrected item-total correlation distributions for all three subscales. Control1 had a slightly lower squared multiple correlation than its colleagues (.484), yet not enough to be considered too problematic. Furthermore, none of the items, if deleted, would have resulted in a distinctly smaller decrease in the variance or an increase in the Cronbach's alpha of the subscales. Control1 obtained a lower correlation with Control4 (.408) and Control5 (.392), but correlations of above .588 with the remaining items. All of the other inter-item correlations were satisfactory and no item consistently correlated lower than the average inter-item correlation with the remaining items of the subscale. Since none of the evidence obtained caused great concern, all 14 items were retained.

5.4.2.2. Routes to psychological ownership dimensionality analysis

Although the current study has investigated and discussed *self-investment, intimate knowledge* and *control of the job (control)* as separate latent variables, they are considered to be subdimensions (and in this case, subscales) of a larger multidimensional variable, namely the *routes to psychological ownership*. Therefore, in line with Lee (2017), both EFA (on the subscales separately) and CFA (on the *routes to psychological ownership* scale) were conducted. The results of the EFA are summarised in Table 5.6.

Table 5.6

EFA Results for the Routes to Psychological Ownership Subscales

Subscale	KMO	Bartlett's Test	Factors extracted	Min factor loading	Max factor loading	Percentage large residuals
Self-investment	.809	643.172 (p<.05)	1	.696	.819	16%
Intimate knowledge	.666	339.070 (p<.05)	1	.588	.882	0%
Control of the job	.858	1256.339 (p<.05)	2	-	-	0%

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Inspection of the three subscales' inter-item correlations revealed that all the correlations exceeded .30 and that all the inter-item correlations were statistically significant ($p<.05$). Table 5.4 indicates that the subscales obtained KMO values larger than .60, and that Bartlett's null hypothesis could be rejected for all three subscales, which supports the subscales' factor analysability. Furthermore, the evidence obtained suggested that a single factor is required to satisfactorily explain the inter-item correlations of the *self-investment* and *intimate knowledge* subscales. For both subscales, only one factor obtained an eigenvalue larger than one and the position of the elbow in the scree plot unambiguously suggested the extraction of a single factor. The four *self-investment* items ($.696 < \lambda_{jk} < .819$) and four *intimate knowledge* items loaded satisfactory ($.588 < \lambda_{jk} < .882$) onto a single factor. Moreover, there were 16% and 0% nonredundant residuals with absolute values greater than .05 for the *self-investment* and *intimate knowledge* subscales, respectively. The unidimensionality assumption was therefore corroborated for the latter two subscales.

However, for the *control* subscale, factor fission occurred. Even though the subscale was factor analysable, the factor loadings were greater than .60 ($.664 < \lambda_{jk} < .885$) and only one factor obtained an eigenvalue greater than one, the position of the elbow on the scree plot was ambiguous and there were 10 (66%) nonredundant residuals with absolute values greater than .05. In other words, a single factor structure provided a rather questionable explanation for the observed inter-item correlations. Since the unidimensionality assumption was not supported for the *control* subscale, the unanticipated multidimensional nature of *control of the job* had to be investigated and a two factor structure was consequently requested.

The pattern matrix, shown in Table 5.7, revealed that items one to three (Control1, Control2 and Control3) loaded onto Factor 1, whereas items four to six (Control4, Control5 and Control6) loaded onto Factor 2.

Table 5.7

Rotated Factor Structure (Pattern Matrix) for the Control Subscale

	Factor 1	Factor 2
Control3	**.887**	.023
Control1	**.769**	.039
Control2	**.706**	-.145
Control5	-.098	**-.977**
Control4	.105	**-.744**
Control6	.390	**-.563**

Upon closer inspection of the items it was evident that Factor 1 can be interpreted as the control that an employee has over external factors that influence *how* they do their job,

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whereas Factor 2 can be interpreted more as the control or autonomy an employee has directly within their job. The factor fission was considered conceptually meaningful. The two extracted factors had a correlation of -.663. Moreover, there were 0% nonredundant residuals with absolute values greater than .05, which suggests that the two factor structure provided a credible and valid explanation for the inter-item correlation matrix. This finding is in line with Lee (2017) who also obtained two factors for the *control* subscale. However, since Lee (2017) utilised the original *control* scale from Tetrick and LaRocco (1987) and the current study opted for the more updated and reliable items adapted by Brown *et al*. (2014), the items loaded slightly differently. Nevertheless, relatively similar results were obtained.

In order to determine whether these items were able to validly reflect *control* as a second-order factor, CFA was conducted based on the factor structure implied by the pattern matrix. The assumption of multivariate normality was not met (χ^2= 188.123; p<.05) and normalisation of the data was attempted. Unfortunately, the chi-square only improved a negligible amount and the null hypothesis was still rejected (χ^2= 186.299; p<.05). The first-order measurement model obtained poor fit. Both the exact fit and close fit null hypotheses were rejected (p<.05).

Inspection of the modification indices for theta-delta revealed that four modification indices out of the original 15 fixed covariances (27%) were statistically significant (p<.01). Figure 5.3 shows the statistically significant (p<.01) modification indices for the first-order *control* measurement model.

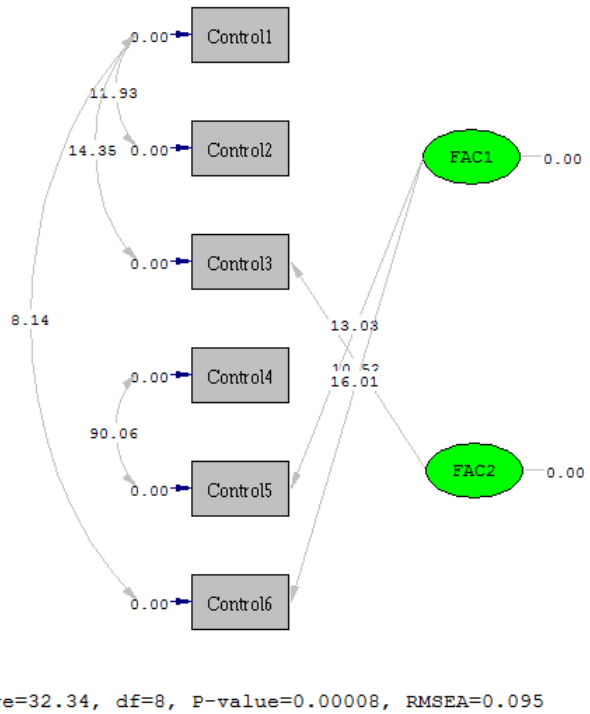

Figure 5.3. **Modification indices for the control measurement model**

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A bi-factor measurement model was consequently fitted to the data. The first *control* bi-factor measurement model that was fitted is shown in Figure 5.4.

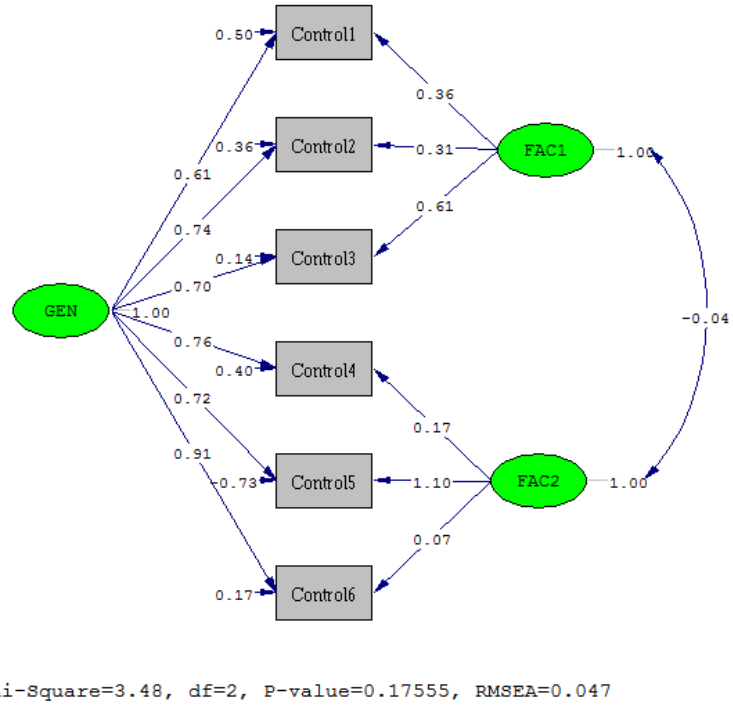

Figure 5.4. **First control bi-factor measurement model (completely standardised solution)**

An insignificant Satorra-Bentler chi-square statistic of 3.478 (p>.05) was obtained for the first *control* bi-factor measurement model, which meant that the exact fit null hypothesis could not be rejected. It was therefore permissible to conclude that the model displayed exact fit[55] in the parameter. Control5, however, returned an inadmissible completely standardised factor loading that exceeded unity and an inadmissible negative measurement error variance estimate. The specification of starting values for the Control5 factor loading did not solve the problem and neither did fixing λ_{52} to .30. Instead, the problem was resolved by changing the estimation method from robust maximum likelihood estimation to robust diagonally weighted least squares (DWLS) estimation, which returned a well-fitting admissible solution shown in Figure 5.5.

The unstandardised lambda-X matrix for the second *control* bi-factor measurement model revealed that all of the *control* items loaded statistically significantly (p<.05) onto the general factor. However, only Control4, Control5 and Control6 loaded statistically significantly (p<.05) onto the second narrow, more specific factor.

[55] It is important to take the low statistical power due to the small degrees of freedom (two) relative to the sample size (340) into consideration when interpreting this finding.

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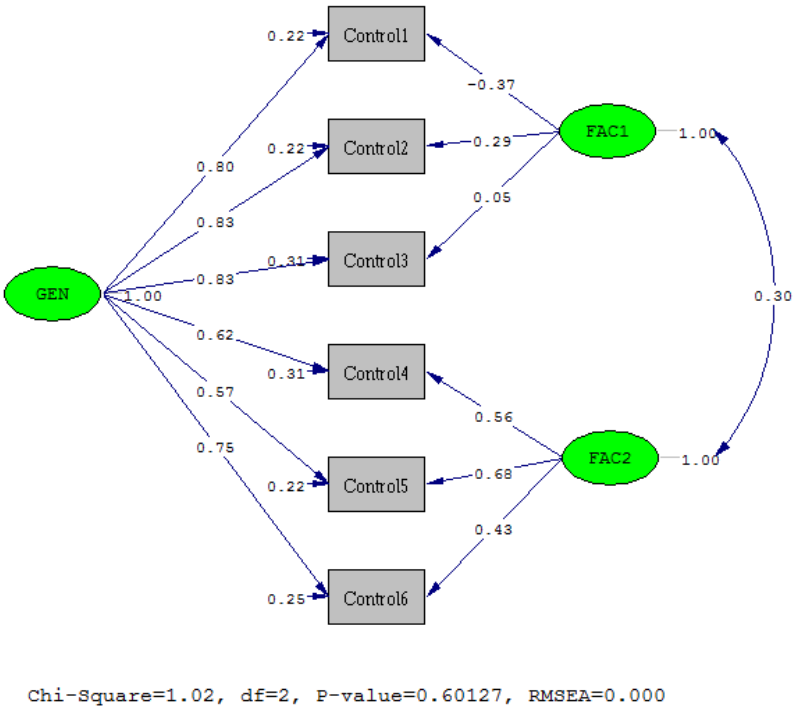

Figure 5.5. **Second control bi-factor measurement model (completely standardised solution)**

Although the ideal would have been for the items to load on both the specific and general factor, the fact that the items loaded on the general factor is more important as this result is in line with the intention of the CFA (which was to ensure that the items accurately reflect the latent *control* variable). The factor fission was, therefore, still regarded as meaningful. Lastly, the R^2 values ranged from .688 to .784, which meant that a large part of the variance in the items were explained by the two factors linked to them, albeit more so by the general factor. The items of the subscale were therefore regarded as valid indicators of the unanticipated multidimensional *control of the job* route. This in turn, justified the CFA on the *routes to psychological ownership* scale.

5.4.2.3. Routes to psychological ownership confirmatory factor analysis

The assumption of multivariate normality for the *routes to psychological ownership* scale was not met as the null hypothesis had to be rejected (χ^2= 940.123; p<.05). Normalisation of the data improved the symmetry and kurtosis of the multivariate indicator variable distribution, but did not completely salvage the situation (χ^2= 311.351; p<.05). RML was thus used as an alternative method of estimation.

The null hypothesis that the first-order measurement model displayed exact fit (χ^2= 272.788; p<.05) and close fit (RMSEA=.089) in the parameter were both rejected (p<.05). Figure 5.6 provides a visual representation of the statistically significant (p<.01) modification indices for the first-order *routes* measurement model.

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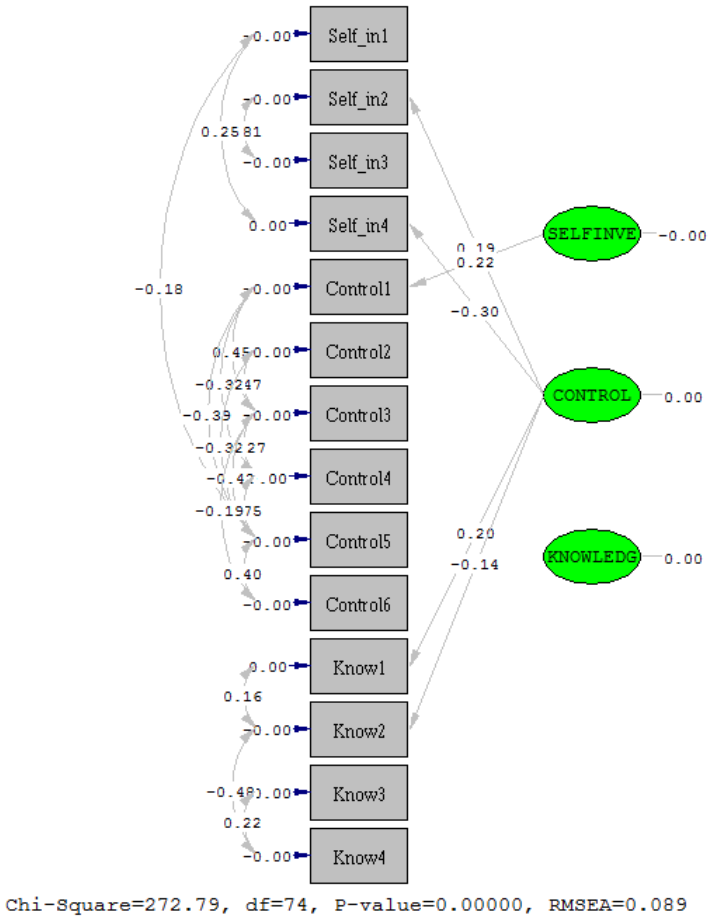

Figure 5.6. **Modification indices for the routes measurement model**

It could be argued that a RMSEA value of .089 indicated mediocre fit, however, the modification indices for theta-delta indicated that 18 out of the 91 (20%) fixed parameter estimates would statistically significantly (p<.01) improve the fit of the model, if freed.

When fitting the *routes* measurement model with two *control* factors, the sample RMSEA estimate improved to .063. However, the close fit null hypothesis was still rejected (p<.05) although the exceedance probability fell, only marginally, below .05 (.0484). Nine statistically significant modification index values were flagged for the measurement error covariances that were fixed to zero in the fitted model.

Since there appeared to be a common source of variance underpinning the items of the *routes* scale over and above the variance accounted for by the specific *route* (*self-investment, intimate knowledge* and *control)*, a bi-factor model was fitted to the data. Figure 5.7 presents the *routes* bi-factor measurement model with one *control* factor.

The *routes* bi-factor measurement with one *control* factor obtained good fit. The Satorra-Bentler chi-square statistic indicated that the exact fit null hypothesis had to be rejected (χ^2= 90.83; p<.05) and that the model did not display exact fit in the parameter. However, the

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close fit null hypothesis was not rejected (RMSEA=.039; p>.05), which provided evidence of good fit for the *routes* bi-factor measurement model.

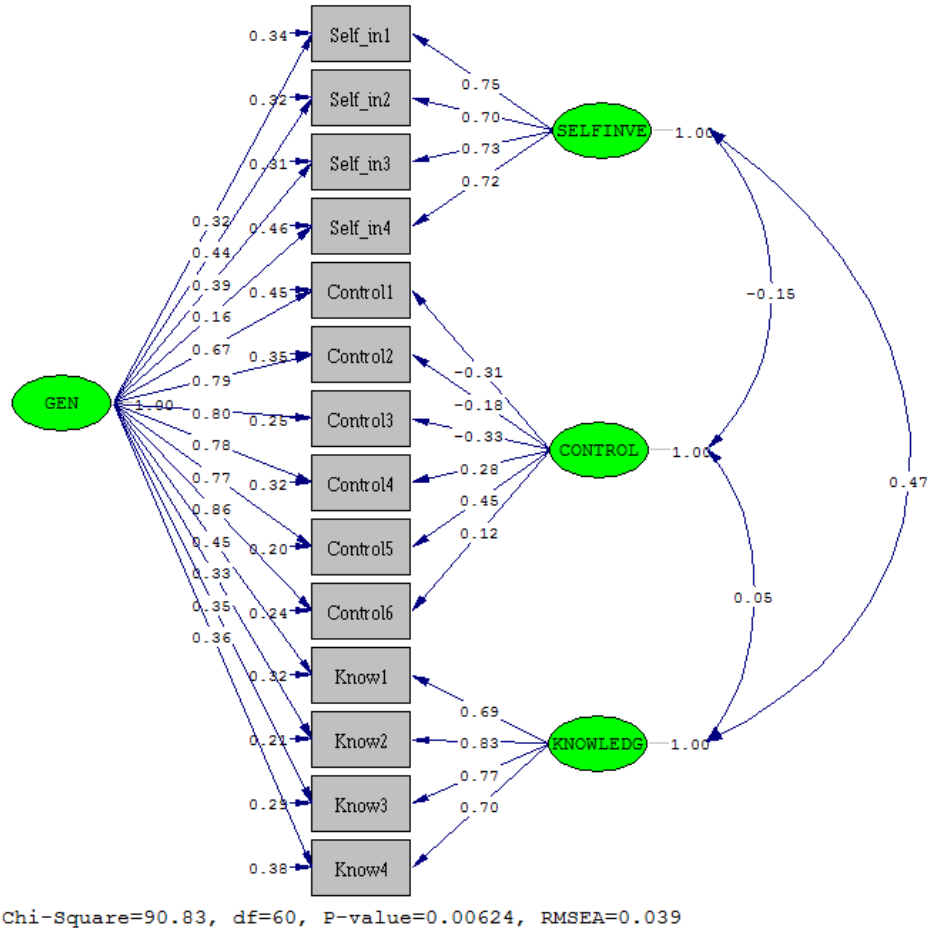

Figure 5.7. **Routes bi-factor measurement model with one control factor (completely standardised solution)**

The unstandardised lambda-X matrix revealed that all the items, besides Control2 and Control6, loaded statistically significantly (p<.05) on the narrow, more specific factor that they were tasked to reflect. Furthermore, all the items also loaded statistically significantly (p<.05) on the broad, general factor. The R^2 values obtained ranged from .539 to .799. This suggested that at least 50% or more of the variance in each item could be explained by the two factors linked to it.

When fitting the *routes* bi-factor measurement model with two *control* factors the sample RMSEA estimate only marginally improved to .038 and the close fit null hypothesis was still not rejected (p>.05). All items loaded statistically significantly (p<.05) on the general factor and on the narrow, more specific factors, except for Control1 and Control3 that loaded statistically insignificantly (p>.05) onto Factor 1. Figure 5.8 shows the *routes* bi-factor measurement model with two *control* factors.

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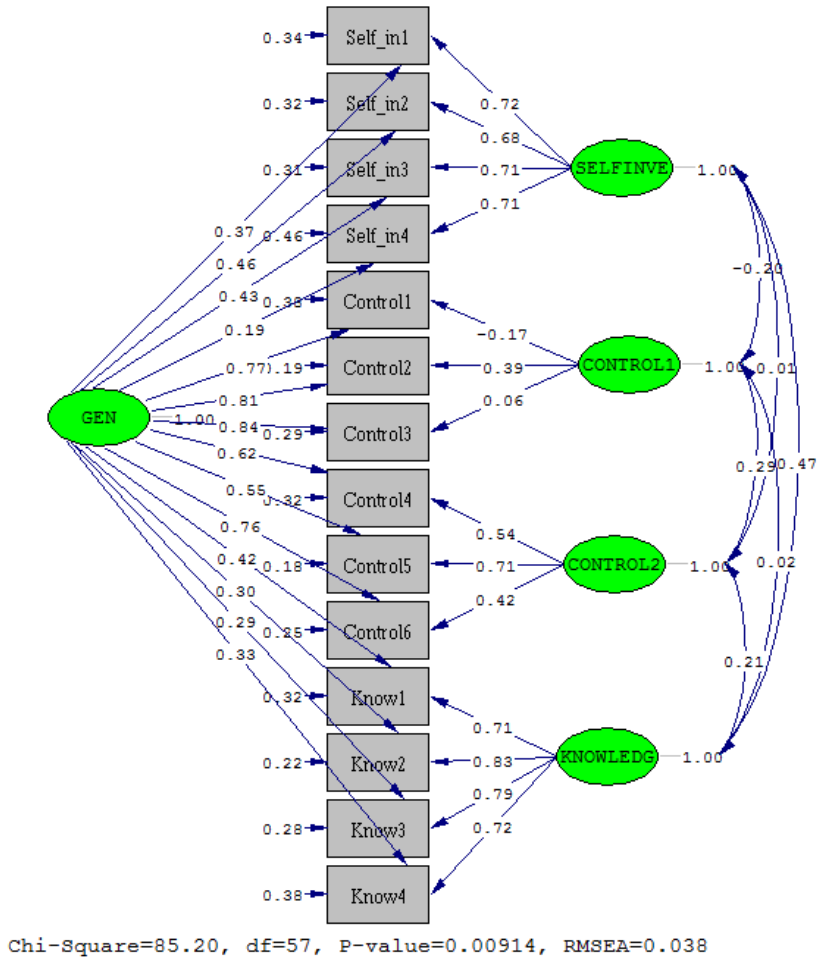

Figure 5.8. **Routes bi-factor measurement model with two control factors (completely standardised solution)**

The basket of evidence thus suggests that the *routes to psychological ownership* construct was successfully operationalised, although not fully as originally intended. The evidence also suggests that the scale can be considered a construct valid measure of the *routes to psychological ownership* construct. The following section describes the psychometric evaluation of the instrument used to measure *job-based psychological ownership.*

5.4.3. Job-based psychological ownership

In the current study, *job-based psychological ownership* was conceptualised as a unidimensional construct. *Job-based psychological ownership* was measured with Brown *et al*.'s (2014) six-item instrument.

5.4.3.1. Job-based psychological ownership item analysis

The item analysis results of the *job-based psychological* scale are presented in Table 5.8. Table 5.8 indicates that a highly satisfactory alpha coefficient of .942 was obtained. Approximately 94% of the variance in the items originate from a systematic (but not

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necessarily unidimensional) source of variance, with 6% of the variance in the item responses due to random measurement error.

Table 5.8

Job-based Psychological Ownership Item Analysis Results

Cronbach's alpha	Scale mean	Scale variance	Scale std. deviation	Average inter-item correlation	Items flagged	N of items
.942	33.1471	58.379	7.64065	.740	Job PO_6	6

	Mean	Std. Deviation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Job PO_1	5.5471	1.34608	27.6000	41.975	.837	.783	.930
Job PO_2	5.5529	1.50520	27.5941	39.640	.869	.793	.925
Job PO_3	5.5559	1.41623	27.5912	40.750	.864	.785	.926
Job PO_4	5.6235	1.34121	27.5235	41.401	.880	.786	.925
Job PO_5	5.7382	1.37584	27.4088	41.883	.820	.717	.931
Job PO_6	5.1294	1.67077	28.0176	40.436	.713	.546	.948

	Job PO_1	Job PO_2	Job PO_3	Job PO_4	Job PO_5	Job PO_6
Job PO_1	1.000	.845	.833	.770	.683	.597
Job PO_2	.845	1.000	.824	.797	.747	.641
Job PO_3	.833	.824	1.000	.775	.768	.633
Job PO_4	.770	.797	.775	1.000	.810	.725
Job PO_5	.683	.747	.768	.810	1.000	.653
Job PO_6	.597	.641	.633	.725	.653	1.000

The absence of extreme means (5.129 to 5.738 on a 7-point Likert scale) and small standard deviations (1.341 to 1.670) suggested that all six items were able to successfully discriminate between individuals that differ in their standing on the *job-based psychological ownership* latent dimension. However, Job PO_6 appeared to be somewhat of an outlier in the distribution of squared multiple correlations (.546) and the distribution of corrected item-total correlations (.713). Job PO_6 also appeared to consistently correlate slightly lower with the remaining items of the subscale than the mean inter-item correlation of .740. If deleted, it would have increased the reliability of the scale from .942 to .948. Although item 6 was flagged as somewhat problematic, the evidence was not enough to warrant its removal.

5.4.3.2. Job-based psychological ownership dimensionality analysis

Dimensionality analysis via EFA was conducted on all six items included in the *job-based psychological ownership* scale, as satisfactory results were obtained from the item analysis. The correlation matrix revealed that all the correlations exceeded .30 and all the inter-item correlations were statistically significant ($p<.05$). The KMO value reported for the scale (.901) and for each item were all above .60. Moreover, the identity matrix null hypothesis

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(which implies that each item measures a unique underlying factor) tested by the Bartlett Test of Sphericity was rejected (1957.751; p=.00), indicating that the scale was factor analysable. Only one factor obtained an eigenvalue greater than one (4.711) and the scree plot suggested the extraction of a single factor, which provided evidence for the unidimensionality assumption. The factor matrix in Table 5.9 indicates that the items loaded highly satisfactory ($.773 < \lambda_{jk} < .908$) onto a single factor.

Table 5.9

Factor Matrix for the Job-Based Psychological Ownership Scale

	Factor 1
Job PO_4	.908
Job PO_2	.906
Job PO_3	.900
Job PO_1	.871
Job PO_5	.847
Job PO_6	.733

Furthermore, a relatively small percentage (20%) of the residual correlations were larger than .05, suggesting that the extracted solution provided a credible explanation for the observed correlation matrix. The evidence therefore convincingly supported the unidimensionality assumption for the *job-based psychological ownership* scale. The following section describes the psychometric evaluation of the *organisation-based psychological ownership* scale.

5.4.4. Organisation-based psychological ownership

Organisation-based psychological ownership was measured with Van Dyne and Pierce's (2004) four-item instrument and two items that were added in the current study.

5.4.4.1. Organisation-based psychological ownership item analysis

The results of the *organisation-based psychological ownership* scale item analysis are provided in Table 5.10.

Table 5.10

Organisation-based Psychological Ownership Item Analysis Results

Cronbach's alpha	Scale mean	Scale variance	Scale std. deviation	Average inter-item correlation	Items flagged	N of items
.938	22.7559	108.356	10.40943	.718	-	6

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Table 5.10

Organisation-based Psychological Ownership Item Analysis Results (continued)

	Mean	Std. Deviation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Org PO_1	3.8500	2.04907	18.9059	74.516	.838	.760	.924
Org PO_2	4.5912	1.86899	18.1647	79.489	.761	.619	.933
Org PO_3	4.2353	1.96667	18.5206	75.873	.835	.714	.925
Org PO_4	3.8029	2.03059	18.9529	73.951	.867	.800	.920
Org PO_5	3.1471	1.93146	19.6088	76.139	.845	.798	.923
Org PO_6	3.1294	2.05119	19.6265	77.078	.752	.706	.935

	Org PO_1	Org PO_2	Org PO_3	Org PO_4	Org PO_5	Org PO_6
Org PO_1	1.000	.743	.764	.838	.717	.612
Org PO_2	.743	1.000	.722	.693	.630	.596
Org PO_3	.764	.722	1.000	.799	.722	.654
Org PO_4	.838	.693	.799	1.000	.789	.658
Org PO_5	.717	.630	.722	.789	1.000	.832
Org PO_6	.612	.596	.654	.658	.832	1.000

A highly satisfactory Cronbach's alpha of .938 was obtained for the *organisation-based psychological ownership* scale. The results indicated an absence of extreme means (3.129 to 4.591 on a 7-point Likert scale) and small standard deviations (1.869 to 2.051), which suggested an absence of poor, insensitive items. Besides Org PO_6, there were no clear outliers towards the lower end of the squared multiple correlation and corrected item-total correlation distributions. Org PO_6 had a slightly lower squared multiple correlation than the other items (.619), yet not enough to be considered too problematic. None of the items, if deleted, would have resulted in a distinctly smaller decrease in the variance or a large increase in the Cronbach's alpha of the scale. Furthermore, it was evident that none of the items consistently correlated lower with the remaining items relative to the average inter-item correlation (.718). The results were thus quite positive and all items were retained.

5.4.4.2. Organisation-based psychological ownership dimensionality analysis

Due to the satisfactory item analysis results, EFA was performed on all six items in the *organisation-based psychological ownership* scale. Inspection of the inter-item correlations revealed that all the correlations exceeded .30 and all the inter-item correlations were statistically significant ($p<.05$). In terms of factor analysability, a KMO of .876 (>.60) was obtained, and the Bartlett Test of Sphericity returned a statistically significant ($p<.05$) chi-square statistic, which meant that the identity matrix null hypothesis could be rejected.

Furthermore, the evidence obtained suggested that a single factor is required to satisfactorily explain the inter-item correlations. Only one factor obtained an eigenvalue

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larger than one (4.596), and the position of the elbow in the scree plot unambiguously suggested the extraction of a single factor. The factor matrix of the scale is presented in Table 5.11.

Table 5.11

Factor Matrix for the Organisation-Based Psychological Ownership Scale

	Factor 1
Org PO_4	.905
Org PO_5	.874
Org PO_1	.873
Org PO_3	.868
Org PO_2	.787
Org PO_6	.779

Table 5.11 indicates that all of the items loaded highly satisfactory ($.779 < \lambda_{jk} < .905$) onto a single factor. Moreover, there were 26% nonredundant residuals with absolute values greater than .05. The unidimensionality assumption was therefore supported for the *organisation-based psychological ownership* scale. The following section describes the psychometric evaluation of the *psychological safety* scale.

5.4.5. Psychological safety

Psychological safety was measured with five items developed by Van Deventer (2015).

5.4.5.1. Psychological safety item analysis

The item analysis results of the *psychological safety* scale are outlined in Table 5.12.

Table 5.12

Psychological Safety Item Analysis Results

Cronbach's alpha	Scale mean	Scale variance	Scale std. deviation	Average inter-item correlation	Items flagged	N of items
.892	18.3353	19.687	4.43696	.624	Safety_3 Safety_4	5

	Mean	Std. Deviation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Safety_1	3.8353	1.01432	14.5000	13.248	.733	.549	.869
Safety_2	3.6118	1.07910	14.7235	12.490	.791	.643	.856
Safety_3	3.6412	.99293	14.6941	13.670	.685	.502	.879
Safety_4	3.5735	1.13559	14.7618	12.973	.663	.500	.886
Safety_5	3.6735	1.08185	14.6618	12.319	.816	.678	.850

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Table 5.12

Psychological Safety Item Analysis Results (continued)

	Safety_1	Safety_2	Safety_3	Safety_4	Safety_5
Safety_1	1.000	.683	.609	.541	.658
Safety_2	.683	1.000	.660	.577	.733
Safety_3	.609	.660	1.000	.468	.621
Safety_4	.541	.577	.468	1.000	.696
Safety_5	.658	.733	.621	.696	1.000

The psychological safety scale obtained a satisfactory alpha coefficient of .892. In other words, approximately 89% of the variance in the scale items originated from a systematic (but not necessarily unidimensional) source of variance, with only 11% of the variance in the item responses due to random measurement error. No extreme item means (3.574 to 3.835 on a 5-point Likert scale) or small standard deviations (ranging from .993 to 1.136) were returned. Although, the standard deviation of Safety_3 was slightly lower (.993) and Safety_4 slightly higher (1.136) than its colleagues, it was not a cause for great concern. Safety_3 and Safety_4 were considered to be slight outliers in the squared multiple correlation and corrected item-total correlation distributions (.502 and .500, respectively). In comparison to the mean inter-item correlation (.624), Safety_4 consistently correlated lower with the remaining items in the scale. Although Safety_4 tended to respond to a somewhat different source of systematic variance than that underpinning its colleagues, the trend was not sufficiently pronounced to increase the scale's alpha coefficient when the item was deleted. The removal of any of the items would, in fact, decrease the scale's Cronbach alpha. All five items were thus maintained.

5.4.5.2. Psychological safety dimensionality analysis

Dimensionality analysis via EFA was conducted on all five items included in the *psychological safety* scale. The correlation matrix revealed that all the correlations exceeded .30 and all the inter-item correlations were statistically significant ($p<.05$). A KMO value of .865 (>.60) provided support for the factor analysability of the scale. The latter finding was corroborated by the Bartlett Test of Sphericity (973.335; $p=.00$), which indicated that the null hypothesis that the correlation matrix in the parameter is an identity matrix, could be rejected. In terms of the scale's factor structure, only one factor obtained an eigenvalue greater than one (3.506). The scree plot also suggested the extraction of a single factor, substantiating the unidimensionality assumption. The factor matrix in Table 5.13 indicates that the items loaded satisfactory ($.705 < \lambda_{jk} < .877$) onto a single factor.

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Table 5.13

Factor Matrix for the Psychological Safety Scale

	Factor 1
Safety_5	.877
Safety_2	.855
Safety_1	.784
Safety_3	.734
Safety_4	.705

Furthermore, a relatively small percentage (10%) of the residual correlations were larger than .05, suggesting that the extracted solution provided a highly credible explanation for the observed correlation matrix. The evidence therefore convincingly supported the unidimensionality assumption for the *psychological safety* scale. The following section describes the psychometric evaluation of the *psychological meaningfulness* scale.

5.4.6. Psychological meaningfulness

Psychological meaningfulness was measured with a six-item scale developed by May *et al*. (2004).

5.4.6.1. Psychological meaningfulness item analysis

Table 5.14 presents the results of the *psychological meaningfulness* scale item analysis.

Table 5.14

Psychological Meaningfulness Item Analysis Results

Cronbach's alpha	Scale mean	Scale variance	Scale std. deviation	Average inter-item correlation	Items flagged	N of items
.949	23.9765	25.781	5.07751	.757	Meaning_6	6

	Mean	Std. Deviation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Meaning_1	4.0794	.87383	19.8971	18.641	.845	.728	.940
Meaning_2	3.8618	1.03123	20.1147	17.388	.852	.787	.939
Meaning_3	4.0235	.94043	19.9529	18.234	.830	.694	.941
Meaning_4	3.9059	.99998	20.0706	17.435	.880	.792	.935
Meaning_5	3.9588	.97373	20.0176	17.551	.893	.809	.933
Meaning_6	4.1471	.85643	19.8294	19.269	.769	.652	.948

	Meaning_1	Meaning_2	Meaning_3	Meaning_4	Meaning_5	Meaning_6
Meaning_1	1.000	.795	.737	.768	.770	.721
Meaning_2	.795	1.000	.733	.831	.829	.621
Meaning_3	.737	.733	1.000	.765	.774	.728
Meaning_4	.768	.831	.765	1.000	.850	.698
Meaning_5	.770	.829	.774	.850	1.000	.739
Meaning_6	.721	.621	.728	.698	.739	1.000

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A highly satisfactory Cronbach's alpha of .949 was obtained for the *psychological meaningfulness* scale. Inspection of the results showed that the item means ranged from 3.861 to 4.147 on a 5-point Likert scale, while the standard deviations ranged from .856 to 1.031. Although there were no extreme means, Meaning_6 returned a standard deviation that was somewhat smaller than that of the other items. This could indicate that in comparison to the other items, Meaning_6 was not as able to successfully discriminate between individuals that differ on the *psychological meaningfulness* latent dimension. It also appeared to be somewhat of an outlier in the distribution of squared multiple correlations (.652) and in the distribution of corrected item-total correlations (.769). Relative to the mean inter-item correlation (.757), Meaning_6 consistently correlated lower with the remaining items in the scale. However, the deletion of Meaning_6 would not have drastically increased the alpha coefficient or resulted in a distinctly smaller decrease in the variance of the scale. In fact, removing Meaning_6 would have resulted in a marginal decrease in the scale's alpha coefficient. Consequently, all items were retained.

5.4.6.2. Psychological meaningfulness dimensionality analysis

The satisfactory item analysis results warranted a dimensionality analysis via EFA on all six items included in the *psychological meaningfulness* scale. Inspection of the inter-item correlations revealed that all the correlations exceeded .30 and all the inter-item correlations were statistically significant ($p<.05$). In terms of factor analysability, a KMO of .909 (>.60) was obtained, and the Bartlett Test of Sphericity returned a statistically significant ($p<.05$) chi-square statistic, which meant that the identity matrix null hypothesis (which implies that each item measures a unique underlying factor) could be rejected. Furthermore, the evidence obtained suggested that a single factor is required to satisfactorily explain the inter-item correlations. Only one factor obtained an eigenvalue larger than one (4.792), and the scree plot suggested the extraction of a single factor. The factor matrix of the scale is presented in Table 5.15.

Table 5.15

Factor Matrix for the Psychological Meaningfulness Scale

	Factor 1
Meaning_5	.921
Meaning_4	.907
Meaning_2	.879
Meaning_1	.870
Meaning_3	.854
Meaning_6	.791

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Table 5.15 indicates that all of the items loaded satisfactory ($.791 < \lambda_{jk} < .921$) onto a single factor. Moreover, there were only 13% nonredundant residuals with absolute values greater than .05. The unidimensionality assumption was therefore convincingly supported for the *psychological meaningfulness* scale. The following section describes the psychometric evaluation of the *salient root needs* scale.

5.4.7. Salient root needs

Since the *salient root needs* were conceptualised as three separate individual or human needs, the construct is considered multi-dimensional. Each subscale was measured with four items developed by Lee (2017).

5.4.7.1. Salient root needs item analysis

The item analysis results of the *efficacy and effectance (efficacy), self-identity* and *sense of belonging (belonging)* subscales are summarised and presented in Table 5.16.

Table 5.16

Salient Root Needs Item Analysis Results

Subscale	Cronbach's alpha	Scale mean	Scale variance	Scale std. deviation	Average inter-item correlation	Items flagged	N of items
Efficacy	.869	24.5294	10.026	3.16634	.629	-	4
Self-identity	.846	22.5206	17.702	4.20733	.580	-	4
Belonging	.817	23.5471	14.750	3.84057	.550	Belong1	4

All three subscales obtained satisfactory alpha coefficients above the critical cut-off of .80. This means that more than approximately 80% of the variance in the items was systematic variance and less than 20% was random error variance. The absence of extreme means (on the 7-point Likert scale) and small standard deviations for each of the subscales' items suggested that the 12 *salient root need* items were able to successfully discriminate between individuals that differ in their standing on the various latent subdimension. Only Belong1 appeared to be an outlier in the distribution of corrected item-total correlations (.596) and in the distribution of squared multiple correlations (.405). It also appeared to have lower inter-item correlations with Belong3 and Belong4 than the average inter-item correlation of .580, but not with Belong2. Belong1 was therefore not consistently out of step with its item colleagues. This in turn, suggested possible factor fission. If deleted, it would also not have significantly increased the alpha coefficient (.813). Since the evidence against Belong1 was not overwhelmingly negative, it was retained in the *belonging* subscale. None of the other items were considered problematic.

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5.4.7.2. Salient root needs dimensionality analysis

Dimensionality analysis via EFA was conducted on the four items included in each of the *salient root needs* subscales. Table 5.17 provides a summary of the EFA results for the *efficacy, self-identity* and *belonging* subscales.

Table 5.17

EFA Results for the Salient Root Needs Subscales

Subscale	KMO	Bartlett's Test	Factors extracted	Min factor loading	Max factor loading	Percentage large residuals
Efficacy	.821	663.377 (p<.05)	1	.734	.835	0%
Self-identity	.806	551.220 (p<.05)	1	.732	.827	0%
Belonging	.763	527.960 (p<.05)	2	-	-	0%

Inspection of the three subscales' inter-item correlations revealed that all the correlations exceeded .30 and that all the inter-item correlations were statistically significant (p<.05). Table 5.17 indicates that the subscales all obtained KMO values larger than .60, and that the Bartlett null hypothesis could be rejected for all three subscales, which supports the subscales' factor analysability. Furthermore, the evidence obtained suggested that a single factor is required to satisfactorily explain the inter-item correlations of the *efficacy* and the *self-identity* subscales. For both subscales, only one factor obtained an eigenvalue larger than one and the position of the elbow in the scree plot unambiguously suggested the extraction of a single factor. The four *efficacy* items ($.734 < \lambda_{i1} < .835$) and four *self-identity* items loaded satisfactory ($.732 < \lambda_{jk} < .827$) onto a single factor. Moreover, there were 0% nonredundant residuals with absolute values greater than .05 for both subscales. The unidimensionality assumption was therefore convincingly supported for the *efficacy* and *self-identity* subscales.

When testing the *belonging* subscale, however, factor fission occurred. Although the subscale was factor analysable, the factor loadings were greater than .50 ($.661 < \lambda_{jk} < .794$) and only one factor obtained an eigenvalue greater than one, the position of the elbow on the scree plot was ambiguous and there were three (50%) nonredundant residuals with absolute values greater than .05. In other words, a single factor structure provided a rather questionable explanation for the observed inter-item correlations.

Since the unidimensionality assumption was not supported for the *belonging* subscale, a two factor structure was consequently requested. The pattern matrix, shown in Table 5.18, reveals that items three and four (Belong3 and Belong4) loaded onto Factor 1, whereas items one and two (Belong1 and Belong2) loaded onto Factor 2.

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Table 5.18

Rotated Factor Structure (Pattern Matrix) for the Belonging Subscale

	Factor 1	Factor 2
Belong4	**.833**	-.039
Belong3	**.758**	.081
Belong1	-.053	**.793**
Belong2	.139	**.720**

Upon closer inspection of the items it was evident that Factor 1 can be interpreted as *needs* related to a *sense of belonging* in a job, whereas Factor 2 can be interpreted more as *desires* related to a *sense of belonging* in a job. In other words, these can be regarded as semantic factors in that they express varying degrees or intensity of the longing for, or pursuit towards a *sense of belonging.* In line with this, the two extracted factors had a very high positive correlation of .759. Moreover, with the two factor structure, there were 0% nonredundant residuals with absolute values greater than .05, which suggested that the two factor structure provided a credible explanation for the inter-item correlation matrix. The unanticipated multidimensional nature of a *sense of belonging* was then investigated via CFA based on the pattern matrix indicated in Table 5.18.

The results indicated that the assumption of multivariate normality was not met (χ^2= 589.20; p<.05) and normalisation of the data was attempted. Although the symmetry and kurtosis of the indicator variable distributions improved a considerable amount, the null hypothesis was still rejected (χ^2= 176.411; p<.05). The normalised data was thus analysed using RML.

The first-order *belonging* measurement model obtained excellent fit in the parameter[56]. A Satorra-Bentler chi-square statistic of .034 and RMSEA value of .000 meant that the exact fit and close fit null hypotheses could not be rejected (p>.05). Furthermore, the unstandardised lambda-X matrix revealed that all four of the *belonging* items loaded statistically significantly (p<.05) onto the Factors implied by the pattern matrix. Lastly, the R^2 values ranged from .549 to .794, which meant that the model provided a satisfactory explanation of the variance in the four items. The factor fission was thus regarded as conceptually meaningful and the items appeared to successfully reflect the *sense of belonging* salient root need. The first-order *belonging* measurement model is shown in Figure 5.9.

[56] It is important to take the low statistical power due to the small degrees of freedom (one) relative to the sample size (340) into consideration when interpreting this finding.

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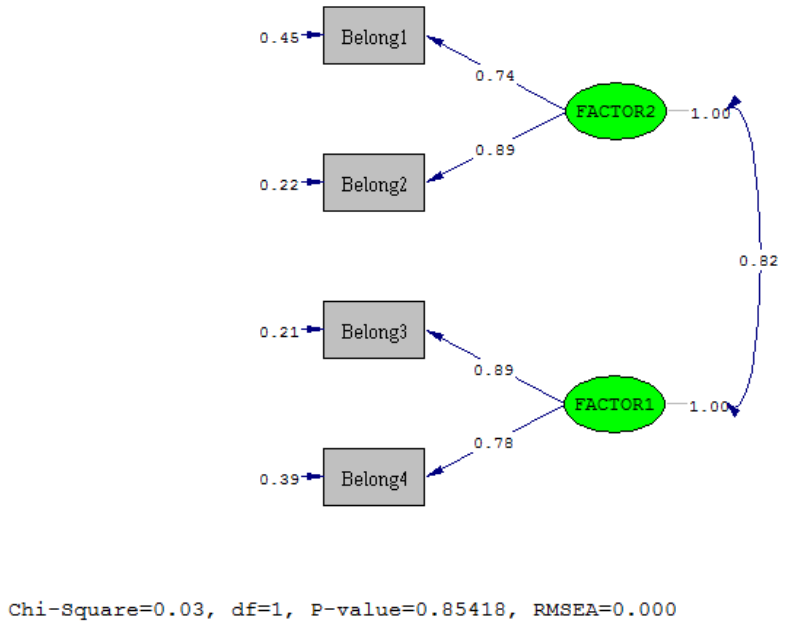

Figure 5.9. **First-order belonging measurement model**

The items of the *belonging* subscale were therefore regarded as valid indicators of the unanticipated multidimensional *sense of belonging* salient root need. This in turn, justified the CFA on the *salient root needs* scale. This conclusion would have been strengthened if the second-order *belonging* measurement model could have been fitted. However, with only four items, the second-order measurement model would have had negative degrees of freedom. This problem could have been circumvented by setting all first-order factor loading for each first-order factor equal to each other, and by setting the two gamma coefficients equal to each other. However, due to the severity of the equality constraints, this option was not implemented.

5.4.7.3. Salient root needs confirmatory factor analysis

The null hypothesis that the item distribution of the *salient root needs* scale follow a multivariate normal distribution had to be rejected (χ^2= 1804.454; p<.05). An attempt at normalising the data using PRELIS improved the symmetry and kurtosis of the multivariate indicator variable distribution (χ^2= 510.115; p<.05), however, the situation was not completely salvaged as multivariate normality was still not achieved. Consequently, RML estimation was used for analysing the normalised data.

The first-order measurement model fitted the data poorly in that the null hypothesis of exact fit, measured by the Satorra-Bentler Scaled chi-square (χ^2= 125.075; p<.05), and close fit (RMSEA=.065) had to be rejected (p<.05). In other words, it was permissible to conclude that this model displayed poor fit in the parameter.

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Inspection of the modification indices for off-diagonal of the theta-delta indicated a large number of fixed parameter estimates that, if set free, would improve the fit of the model. Figure 5.10 provides a visual representation of the statistically significant (p<.01) modification indices for the first-order *salient root needs* measurement model.

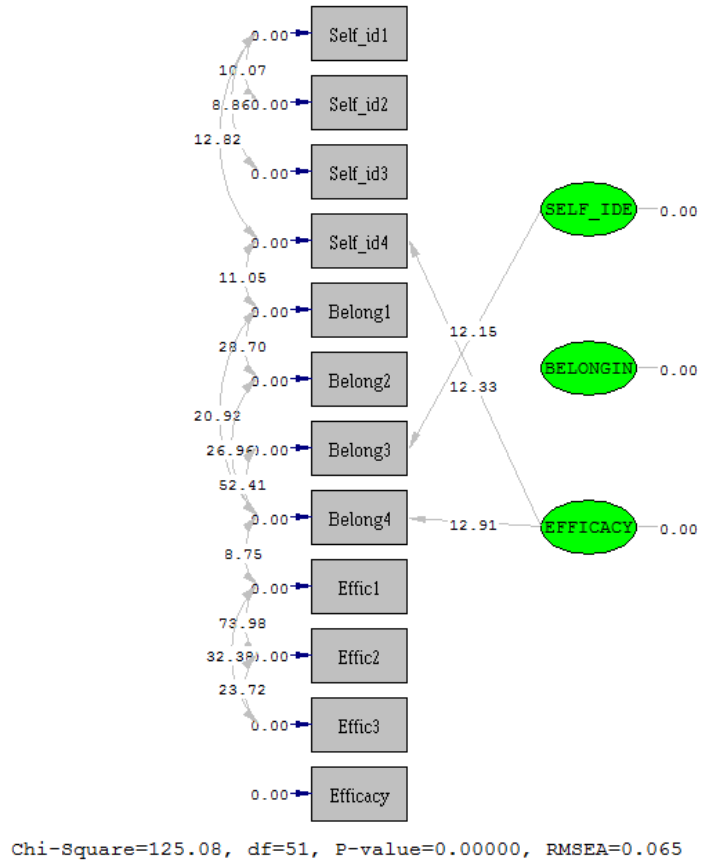

Figure 5.10. **Modification indices for the salient root needs measurement model**

More specifically, 14 of the 66 modification indices calculated for the fixed measurement error covariances (20/66= 30%) were statistically significantly (p<.01). This suggested that a common source of systematic variance underpinning the items of the *salient root needs* scale may have been omitted (e.g., a general factor). A bi-factor model was then fitted to the data in the hope that it would provide a more plausible explanation for the observed inter-item covariance matrix. However, due to an inadmissible statistically significant negative measurement error variance ($\theta_{\delta 88}$) estimate for Belong4, the bi-factor model failed to converge. Attempts to salvage the problem through the use of starting values and fixing λ_{82} to .35, did not have the desired effect. However, two other options were implemented that did provide a solution. The first option that solved the problem, was to remove the item. The model was consequently refitted to the data.

The Satorra-Bentler chi-square statistic indicated that the exact fit null hypothesis could not be rejected (χ^2= 35.73; p>.05) and that the model displayed exact fit in the parameter. The

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close fit null hypothesis was also not rejected (RMSEA=.024; p>.05), which provided evidence of excellent fit for the *salient root needs* bi-factor measurement model after the removal of Belong4.

The unstandardised lambda-X matrix indicated that all the items loaded statistically significantly (p<.05) on the narrow, more specific factor that they were tasked to reflect. With the exception of Self_id1 that obtained a z-value of 1.855, which is slightly below the cut-off of 1.96, all the items loaded statistically significantly (p<.05) onto the broad, general factor. The R^2 values ranged from .540 to .777, which suggested that at least 50% or more of the variance in each item could be explained by the two factors linked to it. Figure 5.11 provides a visual representation of the *salient root needs* bi-factor measurement model.

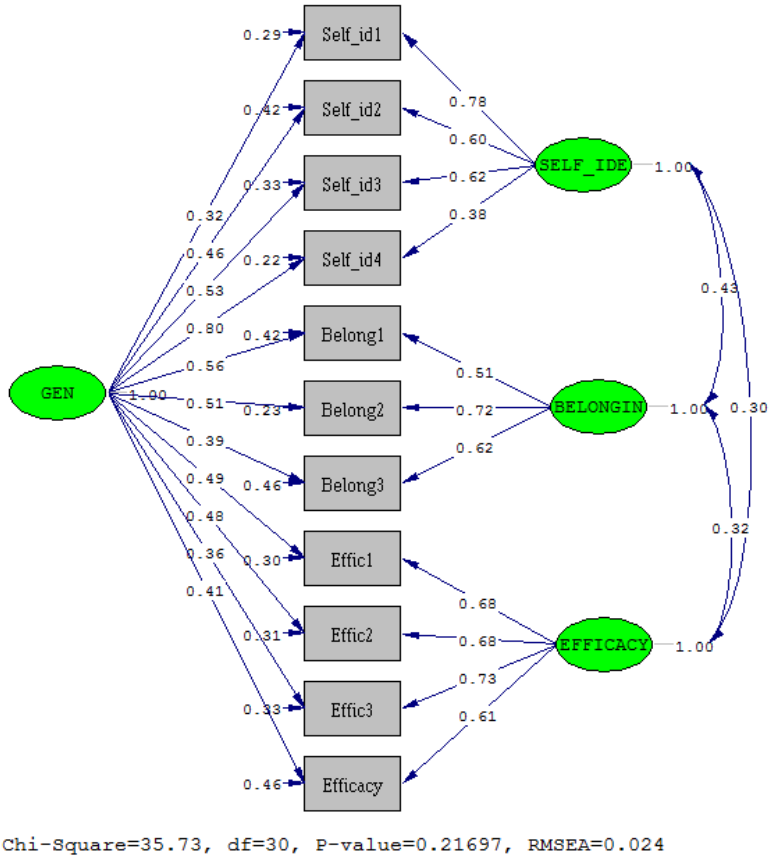

Figure 5.11. **Salient root needs bi-factor measurement model with one belonging factor (completely standardised solution)**

It is therefore permissible to conclude that with the exception of Belong4, the operationalisation of the *salient root needs* construct was largely successful and that the scale can be considered a construct valid measure.

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The second option that also solved the problem, was to fit the *salient root needs* bi-factor measurement model with two *belonging* factors[57] and to specify the four *belonging* items loading in accordance with the loading pattern shown in Table 5.18. An admissible solution was obtained in 57 iterations. The *salient root needs* bi-factor measurement model with two *belonging* factors is shown in Figure 5.12.

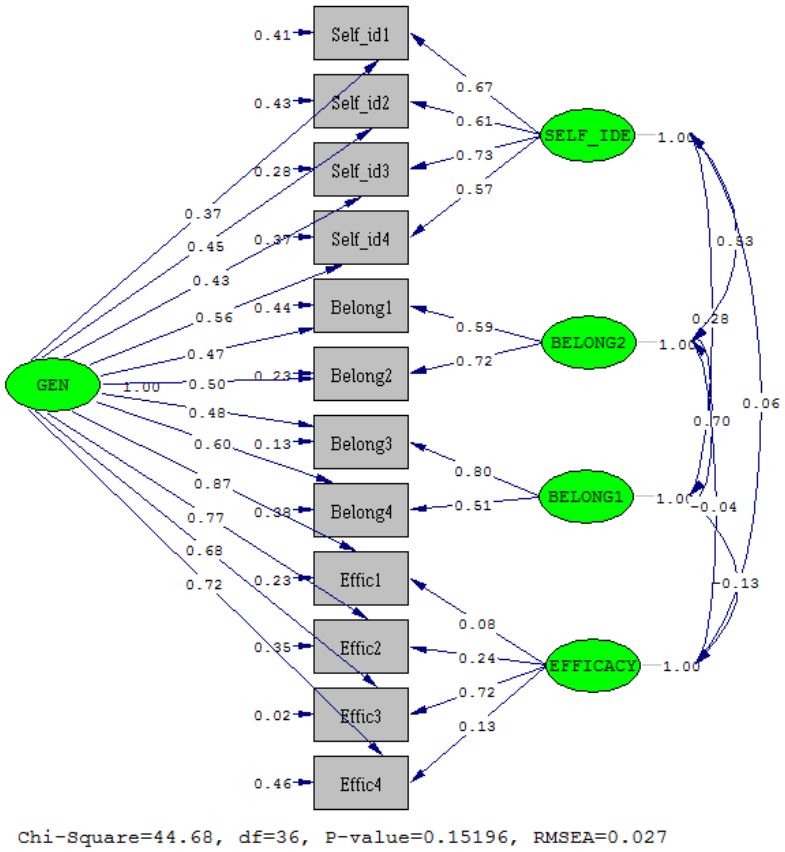

Figure 5.12. **Salient root needs bi-factor measurement model with two belonging factors (completely standardised solution)**

Both the exact fit (χ^2= 44.682; p>.05) and close fit (RMSEA=.027; p>.05) were not rejected. All items loaded statistically significantly (p<.05) on the general *roots* factor. All the items that loaded on the narrow *self-identity* factor and on the two narrow *belonging* factors were statistically significant (p<.05). However, Effic1, Effic2 and Effic4 loaded statistically insignificantly (p>.05) on the narrow *efficacy* factor. The R^2 values ranged from .543 (Effic4) to .873 (Belong3), which suggested that at least 50% or more of the variance in each item could be explained by the two factors linked to it. It is therefore also from this perspective permissible to conclude that the operationalisation of the *salient root needs* construct was largely successful and that the scale can be considered a construct valid measure. The

[57] The first-order *salient root needs* bi-factor measurement model with two belonging factors showed close fit RMSEA=.051; p>.05). Numerous statistically significant modification index values for the off-diagonal of Θ_δ, however, still pointed towards a bi-factor model.

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following section describes the psychometric evaluation of the scales used to measure *motivation to pursue the routes to psychological ownership.*

5.4.8. Motivation to pursue the routes

As discussed in Chapter 2, *motivation to pursue the routes* is a very complex and multidimensional construct with *valence* and *expectancy* as subdimensions. Each subdimension was measured with a separate subscale comprising nine items that was developed by Lee (2017). Within both subscales, the motivational element (*valence* or *expectancy*) associated with each *route* (*self-investment, intimate knowledge* and *control of the job*) was measured with three items. More specifically, items one, four and seven on both subscales were designed to measure either the *valence* or *expectancy* associated with *intimate knowledge*. Items two, five and eight were designed to measure the *valence* or *expectancy* associated with *self-investment,* while items three, six and nine were designed to measure the *valence* or *expectancy* associated with *control of the job*. In line with Lee's (2017) suggestion in response to the unfortunate EFA results obtained for the subscales, it was thus decided to investigate the routes as unidimensional constructs within the two motivational areas of *valence* and *expectancy.*

5.4.8.1. Motivation to pursue the routes item analysis

The item analysis results of the *valence* and *expectancy* subscales are presented in a summarised fashion in Table 5.19.

Table 5.19

Motivation to Pursue the Routes Item Analysis Results

Subscale	Cronbach's alpha	Scale mean	Scale variance	Scale std. deviation	Average inter-item correlation	Items flagged	N of items
Valence_SI	.702	16.2618	11.846	3.44176	.446	Valence_8	3
Valence_IK	.840	18.0882	8.842	2.97351	.645	-	3
Valence_C	.877	16.7559	14.775	3.84383	.705	-	3
Expectancy_SI	.715	16.9794	8.852	2.97524	.462	Expectancy_8	3
Expectancy_IK	.815	18.5206	5.584	2.36297	.603	-	3
Expectancy_C	.899	16.4853	15.377	3.92140	.748	-	3

Valence_SI: self-investment route; Valence_IK: intimate knowledge route; Valence_C: control of the job route
Expectancy_SI: self-investment route; Expectancy_IK: intimate knowledge route; Expectancy_C: control of the job route

All of the *motivation to pursue the routes* subscales, except for the motivation associated with the *self-investment* route, obtained a Cronbach's alpha above the critical cut-off point (.80). Both *valence_SI* (.702) and *expectancy_SI* (.715) were unsuccessful at attaining this criterion, which to some degree questions the internal consistency of these subscales. The fact that no extreme item means or low standard deviations were obtained suggested an

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absence of poor or problematic items. Contrary to the latter, item eight on both scales (Valence_8 and Expectancy_8) appeared to be clear outliers in the distribution of squared multiple correlations (Valence_8 = .254 and Expectancy_8 = .211) and corrected item-total correlations (Valence_8 = .409 and Expectancy_8 = .423). These two items also consistently correlated lower with the remaining items in their respective subscales. Furthermore, the deletion of these two items would have increased the reliability of the *valence_SI* subscale to .735 and the *expectancy_SI* subscale to .750. Although the researcher is of the opinion that some of the items do not properly reflect the route which Lee (2017) intended them measure, it was decided to retain all items in the subscales due to the limited number of items designed to measure each *route.* The items designed to measure the *self-investment* route appeared to reflect *self-identity* root instead. Nevertheless, referring back to the argument of the accumulation of knowledge, the items were used as they were in Lee (2017) to ensure consistency.

5.4.8.2. Motivation to pursue the routes dimensionality analysis

Despite the two flagged and problematic items highlighted in the item analysis, dimensionality analysis was conducted on all nine items included in the *valence* subscale and the *expectancy* subscale. The results of the EFA analysis for the *valence* subscales are summarised in Table 5.20.

Table 5.20

EFA Results for the Valence of Motivation to Pursue Subscales

Subscale	KMO	Bartlett's Test	Factors extracted	Min factor loading	Max factor loading	Percentage large residuals
Valence_SI	.562	242.357 (p<.05)	1	.708	.896	100%
Valence_IK	.701	452.306 (p<.05)	1	.686	.897	0%
Valence_C	.743	526.840 (p<.05)	1	.823	.855	0%

Valence_SI: self-investment route; Valence_IK: intimate knowledge route; Valence_C: control of the job route

When conducting principal axis factor analysis on the *valence_SI* subscale, communality of an item exceeded one and factor extraction was terminated. After an unsuccessful attempt of increasing the iterations from 25 to 500, principal component analysis was conducted on the *valence_SI* subscale, which returned the results reported in Table 5.20.

With the exception of the *valence_SI* subscale, each subscale's correlation matrix revealed that all the correlations exceeded .30 and all the inter-item correlations were statistically significant (p<.05). The inter-item correlation between item eight and five of the *valence_SI* subscale was only .249, yet still statistically significant (p<.05). The KMO values reported were above .60, besides for the *valence_SI* subscale that obtained a KMO of .562.

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Moreover, the null hypothesis tested by the Bartlett Test of Sphericity was rejected for all of the subscales, confirming the subscales' factor analysability.

In each subscale's case, only one factor obtained an eigenvalue larger than one and the scree plot suggested the extraction of a single factor, supporting the unidimensionality assumption of the subscales. The three *valence_SI* items ($.708 < \lambda_{jk} < .896$), *valence_IK* items ($.686 < \lambda_{jk} < .897$) and *valence_C* items ($.823 < \lambda_{jk} < .855$) loaded satisfactory onto a single factor. Furthermore, for all but *valence_SI* (100%), there were no residual correlations that were larger than .05, suggesting that the extracted solutions provided a highly credible explanation for the observed correlation matrices. As a result of the *valence_SI* subscale's small size, an EFA (with a forced two factor structure) and CFA was not performed after the factor fission was identified. Even though the problematic nature of the *valence_SI* subscale is strongly acknowledged, the researcher was of the belief that the removal of a certain item would not have resulted in a better picture as the subscale's design intention was flawed. Nevertheless, the evidence overall supported the unidimensionality assumption for the *valence_IK* and *Valence_C* subscales. The results of the EFA analysis for the *expectancy* subscales are summarised in Table 5.21.

Table 5.21

EFA Results for the Expectancy of Motivation to Pursue Subscales

Subscale	KMO	Bartlett's Test	Factors extracted	Min factor loading	Max factor loading	Percentage large residuals
Expectancy_SI	.613	237.778 (p<.05)	1	.488	.933	0%
Expectancy_IK	.698	372.357 (p<.05)	1	.711	.886	0%
Expectancy_C	.738	645.759 (p<.05)	1	.792	.907	0%

Expectancy_SI: self-investment route; Expectancy_IK: intimate knowledge route; Expectancy_C: control of the job route

Inspection of the subscales' inter-item correlations revealed that all the correlations exceeded .30 and that all the inter-item correlations were statistically significant (p<.05). In terms of factor analysability, Table 5.21 indicates that the subscales obtained KMO values larger than .60, and that Bartlett's null hypothesis could be rejected for all three *expectancy* subscales. Furthermore, the evidence obtained suggested that a single factor is required to satisfactorily explain the inter-item correlations of the *expectancy_SI*, *expectancy_IK* and *expectancy_C* subscales. For all three subscales, only one factor obtained an eigenvalue larger than one and the position of the elbow in the scree plot unambiguously suggested the extraction of a single factor. The three *expectancy_IK* items ($.711 < \lambda_{jk} < .886$) and three *expectancy_C* items ($.792 < \lambda_{jk} < .907$) loaded satisfactory onto a single factor, whereas item eight (Expectancy_8) of the *expectancy_SI* subscale returned a factor loading (.488)

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only slightly below the cut-off of .50. Lastly, there were 0% nonredundant residuals with absolute values greater than .05 for all three subscales. Overall, the evidence convincingly confirmed the unidimensionality assumption for the *expectancy* subscales. The results of the foregoing analyses warranted a CFA on the entire *motivation to pursue the routes* scale.

5.4.8.3. Motivation to pursue the routes confirmatory factor analysis

The assumption of multivariate normality was not met for the *motivation to pursue the routes* scale as the null hypothesis had to be rejected (χ^2= 4032.009; p<.05). Normalisation of the data improved the symmetry and kurtosis of the multivariate indicator variable distribution, but did not completely salvage the situation (χ^2= 1077.170; p<.05). RML was thus used as an alternative method of estimation. The null hypothesis that the first-order measurement model displayed exact fit (χ^2= 312.369; p<.05) and close fit (RMSEA=.072) in the parameter was rejected (p<.05). Figure 5.13 shows the modification indices for the first-order *motivation* measurement model.

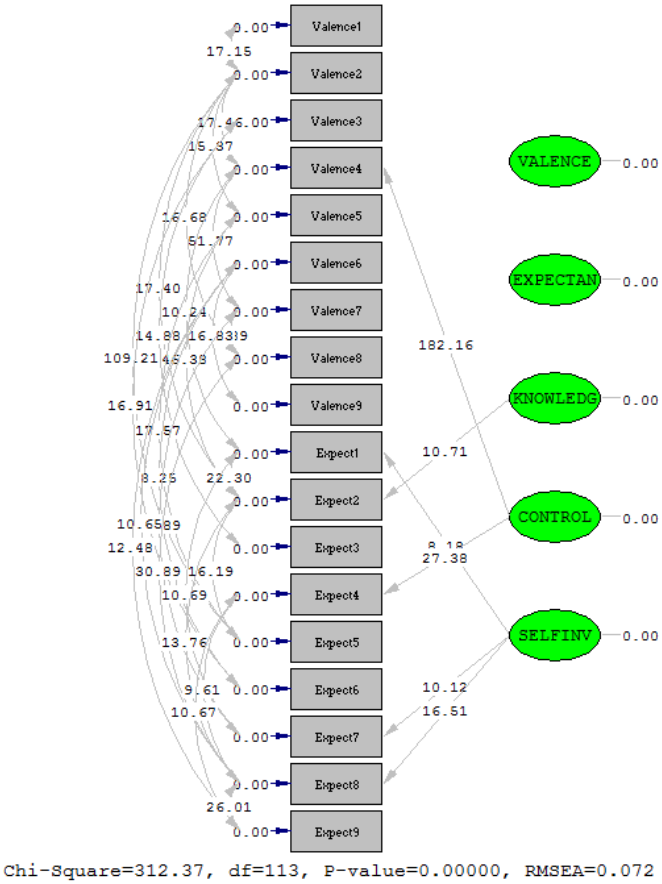

Figure 5.13. **Modification indices for the motivation measurement model**

It could be argued that a RMSEA value of .072 indicated reasonable fit, however, the modification indices for theta-delta indicated that 32 out of the 153 (21%) currently fixed measurement error covariance parameters would statistically significantly (p<.01) improve the fit of the model, if freed.

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Since there appeared to be an additional common source of systematic variance underpinning the items of the *motivation* scale over and above the variance accounted for by the *valence* or *expectancy* associated with the particular *route* (*self-investment, intimate knowledge* and *control of the job)*, a bi-factor model was fitted to the data. Figure 5.14 presents the *motivation* bi-factor measurement model.

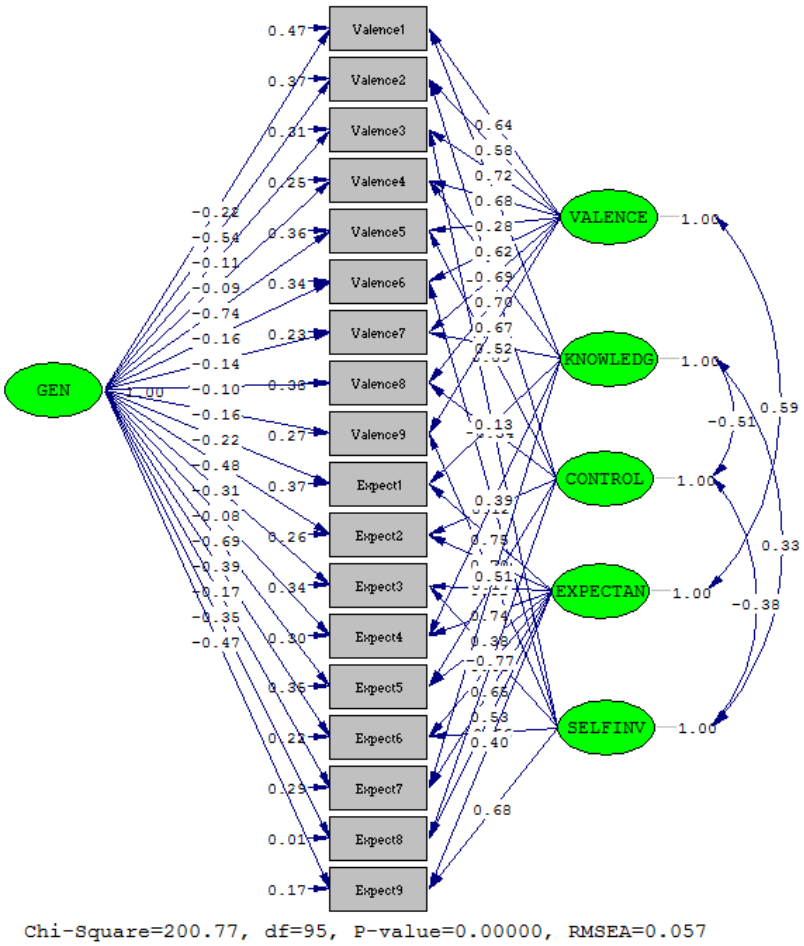

Figure 5.14. **Motivation bi-factor measurement model (completely standardised solution)**

The *motivation* bi-factor measurement obtained good fit. The Satorra-Bentler chi-square statistic indicated that the exact fit null hypothesis had to be rejected (χ^2= 200.769; p<.05) and that the model did not display exact fit in the parameter. However, the close fit null hypothesis was not rejected (RMSEA=.057; p>.05), which provided evidence of good fit for the *motivation* bi-factor measurement model in the parameter.

Inspection of the unstandardised lambda-X matrix revealed different results for the two subscales. All the items, except for Valence2, Valence5, Expect1, Expect2 and Expect5, loaded statistically significantly (p<.05) on the narrow, more specific factor that they were tasked to reflect. However, for the *valence* subscale, only Valence1, Valence2 and Valence5

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loaded statistically significantly (p<.05) on the broad, general factor, whereas for the *expectancy* subscale all of the items, besides Expect4 and Expect7 loaded statistically significantly (p<.05) on the broad, general factor. However, it should be acknowledged that all of the loadings were negative, which means that the general factor was calibrated in a manner that high values are associated with low scores on the items and vice versa. The R^2 values obtained ranged from .533 to .991. This suggested that at least 50% or more of the variance in each item could be explained by the two factors linked to it.

The basket of evidence thus suggests that the *motivation to pursue the routes* construct was successfully operationalised and that the scale can be considered a construct valid measure. The following section describes the psychometric evaluation of the scales used to measure *employee creativity and entrepreneurial behaviour.*

5.4.9. Employee creativity and entrepreneurial behaviour

Employee creativity and entrepreneurial behaviour is also a multidimensional construct. *Employee creativity (creativity)* was measured with eight items (adapted from Tierney *et al.,* 1999), whereas *entrepreneurial behaviour (entrepreneurial)* was measured with six items (adapted from Sieger *et al.,* 2013).

5.4.9.1. Creativity and entrepreneurial behaviour item analysis

The summarised item analysis results of the *creativity* and *entrepreneurial behaviour* subscales are presented in Table 5.22.

Table 5.22

Creativity and Entrepreneurial Behaviour Subscales Item Analysis Results

Subscale	Cronbach's alpha	Scale mean	Scale variance	Scale std. deviation	Average inter-item correlation	Items flagged	N of items
Creativity	.905	41.6000	74.612	8.63785	.554	Creat8	8
Entrepreneurial	.916	29.5765	56.451	7.51341	.646	Entrep6	6

A highly satisfactory Cronbach's alpha of .905 was obtained for the *creativity* scale and an equally satisfactory .916 for the *entrepreneurial* scale. The item means ranged from 4.250 to 5.620 for the *creativity* scale and from 4.535 to 5.100 for the *entrepreneurial* scale on a 7-point scale. The standard deviations ranged from 1.198 to 1.669 for the *creativity* scale and 1.431 to 1.587 for the *entrepreneurial* scale. The 14 items were therefore able to successfully discriminate between individuals that differ in their standing on the two latent subdimensions. Both Creat8 and Entrep6 appeared to be slight outliers in the distribution of corrected item-total correlations and the distribution of squared multiple correlations.

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Furthermore, it was evident that these two items also consistently correlated lower with the remaining items in their subscales relative to each subscale's mean inter-item correlation. However, if deleted, these items would not have increased the alpha coefficient of the *creativity* (.903) or *entrepreneurial* (.912) scale, or brought about a distinctly smaller decrease in either scale's variance. Since the evidence was not overwhelmingly negative, Creat8 and Entrep6 were retained.

5.4.9.2. Creativity and entrepreneurial behaviour dimensionality analysis

Since the *employee creativity and entrepreneurial behaviour* scale is multidimensional, dimensionality analysis via EFA was conducted on the *creativity* subscale and the *entrepreneurial behaviour* subscale separately. The results of the EFA analyses are summarised in Table 5.23.

Table 5.23

EFA Results for the Creativity and Entrepreneurial Subscales

Subscale	KMO	Bartlett's Test	Factors extracted	Min factor loading	Max factor loading	Percentage large residuals
Creativity	.898	1565.917 (p<.05)	1	.645	.810	25%
Entrepreneurial	.910	1326.312 (p<.05)	1	.712	.838	13%

The inter-item correlations of both subscales revealed that all the correlations exceeded .30 and that all the inter-item correlations were statistically significant (p<.05). Table 5.23 shows that the *creativity* and *entrepreneurial* subscales obtained KMO values of .898 and .910 (>.60), respectively. Additionally, Bartlett's null hypothesis could be rejected for both subscales, which provides support for the factor analysability of the subscales.

The evidence obtained suggested that a single factor is required to satisfactorily explain the inter-item correlations of the *creativity* and *entrepreneurial* subscales. For both subscales, only one factor obtained an eigenvalue larger than one and the position of the elbow in the scree plot unambiguously suggested the extraction of a single factor. The eight *creativity* items ($.645 < \lambda_{jk} < .810$) and six *entrepreneurial* items loaded satisfactory ($.712 < \lambda_{jk} < .838$) onto a single factor. Moreover, there were 25% and 13% nonredundant residuals with absolute values greater than .05 for the *creativity* and *entrepreneurial* subscales, respectively. The unidimensionality assumption was therefore corroborated for the *creativity* and *entrepreneurial* subscales, which justified performing a CFA on the entire *creativity and entrepreneurial behaviour* scale.

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5.4.9.3. Creativity and entrepreneurial behaviour confirmatory factor analysis

The null hypothesis that the item distribution follow a multivariate normal distribution had to be rejected (χ^2= 1504.375; p<.05). An attempt at normalising the data using PRELIS improved the symmetry and kurtosis of the multivariate indicator variable distribution (χ^2= 855.331; p<.05), however, multivariate normality was still not achieved. Consequently, RML estimation was used to analyse the normalised data.

Although the first-order measurement model appeared to have reasonable fit, the null hypothesis of exact fit, measured by the Satorra-Bentler Scaled chi-square (χ^2= 205.457; p<.05), and the close fit null hypothesis (RMSEA=.071) had to be rejected (p<.05). In other words, it was permissible to conclude that this model displayed poor fit in the parameter. Figure 5.15 exhibits the statistically significant (p<.01) modification indices for the first-order *creativity and entrepreneurial behaviour* measurement model.

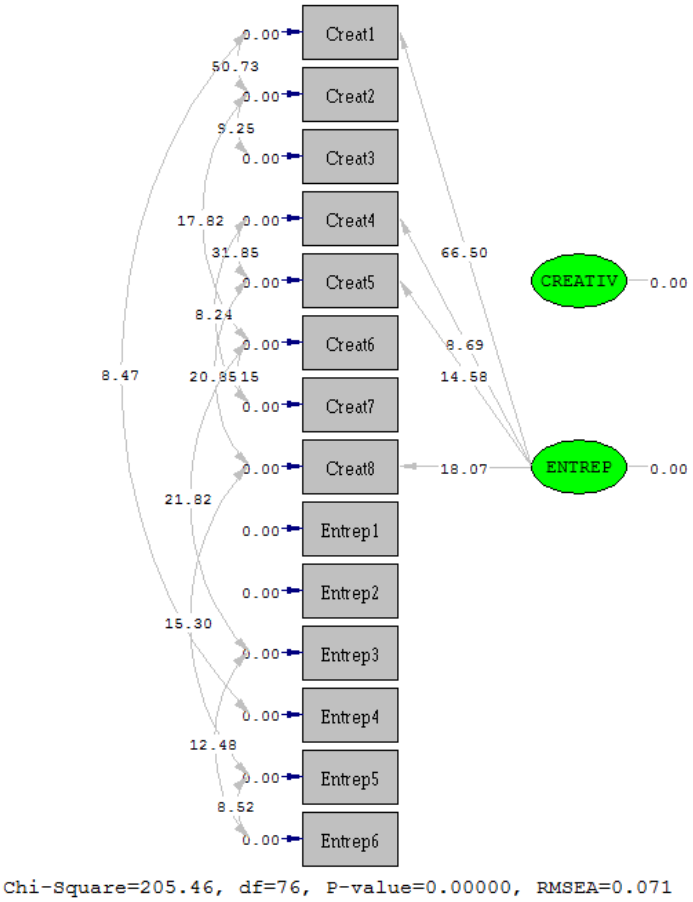

Figure 5.15. **Modification indices for the creativity and entrepreneurial behaviour measurement model**

The modification indices for the off-diagonal of the theta-delta measurement error variance-covariance matrix suggested several fixed covariance terms that if set free, would statistically significantly (p<.01) improve the fit of the model. More specifically, 13 of the 91

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modification indices calculated for the fixed covariances (13/91= 15%) were statistically significantly (p<.01). In other words, there appeared to be an overlooked additional common source of systematic variance underpinning the items of the *creativity and entrepreneurial behaviour* scale (e.g., a general factor). Consequently, a bi-factor model was then fitted to the data. The *creativity and entrepreneurial behaviour* bi-factor measurement model is illustrated in Figure 5.16.

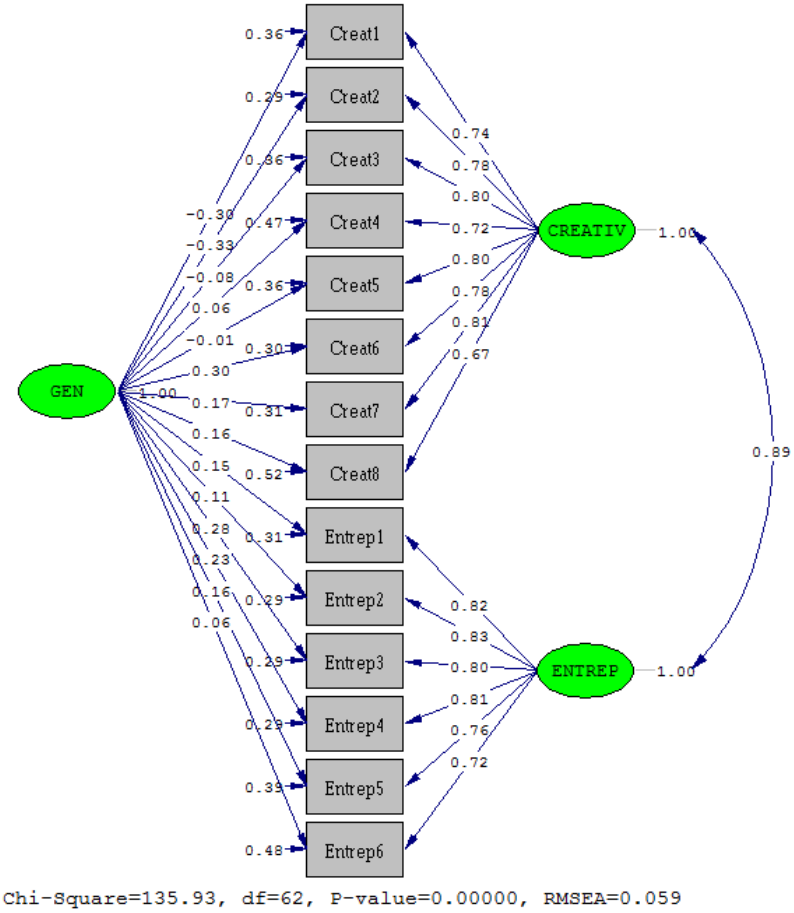

***Figure 5.16*. Creativity and entrepreneurial behaviour bi-factor measurement model (completely standardised solution)**

The Satorra-Bentler chi-square statistic suggested that the exact fit null hypothesis had to be rejected (χ^2= 135.926; p<.05) and that the model did not display exact fit in the parameter. However, the close fit null hypothesis was not rejected (RMSEA=.059; p>.05), which provided evidence of good fit for the *creativity and entrepreneurial behaviour* bi-factor measurement model in the parameter.

The unstandardised lambda-X matrix indicated that all the items loaded statistically significantly (p<.05) on the narrow, more specific factor that they were tasked to reflect. However, none of the items loaded statistically significantly (p>.05) on the broad, general factor. The values obtained for R^2 ranged from .479 to .712. This suggested that at least

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40% or more of the variance in each item could be explained by the specific factor that each item was supposed to reflect and due to the general factor, albeit marginally in the sample and not statistically significantly so.

It is therefore permissible to conclude that the operationalisation of the *creativity and entrepreneurial behaviour* construct was largely successful and that the scale can be considered a construct valid measure. The following section described the psychometric evaluation of the scale designed to measure *accomplishing objectives.*

5.4.10. Accomplishing objectives

Accomplishing objectives was measured with eight items, based on the three dimensions of *achieving personal targets, contributing to team objectives* and *furthering organisational goals* (Saville *et al.,* 2013). *Contributing to team objectives*, however, was evaluated with only two items. Due to the fact that it would be impractical to perform an item analysis and EFA on a subscale with two items, it was decided to conduct an item analysis and CFA[58] on the entire scale instead[59].

5.4.10.1. Accomplishing objectives item analysis

The item analysis results of the *accomplishing objectives* scale are shown in Table 5.24.

Table 5.24

Accomplishing Objectives Item Analysis Results

Cronbach's alpha	Scale mean	Scale variance	Scale std. deviation	Average inter-item correlation	Items flagged	N of items
.872	47.4353	35.480	5.95647	.479	-	8

	Mean	Std. Deviation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Object1	5.8853	.96016	41.5500	28.024	.643	.518	.855
Object2	5.6235	1.25721	41.8118	26.088	.608	.476	.861
Object3	5.9265	.92037	41.5088	27.484	.741	.652	.846
Object4	6.3647	.74227	41.0706	30.131	.589	.423	.863
Object5	5.7588	1.16516	41.6765	26.697	.617	.405	.859
Object6	5.7941	1.06927	41.6412	27.411	.619	.424	.858
Object7	5.8706	1.15509	41.5647	26.772	.617	.456	.859
Object8	6.2118	.81786	41.2235	28.676	.700	.573	.852

[58] This may be a very conservative manner for evaluating the scale's items and that it could potentially underestimate the scale's reliability. Furthermore, even though the unidimensionality assumption of the scale was not explicitly tested, the ultimate goal was to use the specific items to operationalise *accomplishing objectives* as a multidimensional construct in the *psychological ownership* structural model. This in turn, justified conducting a CFA on the scale as a whole.

[59] It is acknowledged that these analysis problems should have been foreseen when the composite Psychological Ownership Questionnaire was compiled.

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Table 5.24

Accomplishing Objectives Item Analysis Results (continued)

	AO _1	AO_2	AO _3	AO _4	AO _5	AO _6	AO _7	AO _8
Object1	1.000	.560	.695	.398	.397	.419	.407	.467
Object2	.560	1.000	.649	.353	.425	.374	.427	.390
Object3	.695	.649	1.000	.545	.468	.476	.435	.538
Object4	.398	.353	.545	1.000	.460	.411	.403	.567
Object5	.397	.425	.468	.460	1.000	.524	.466	.490
Object6	.419	.374	.476	.411	.524	1.000	.478	.563
Object7	.407	.427	.435	.403	.466	.478	1.000	.625
Object8	.467	.390	.538	.567	.490	.563	.625	1.000

Object: accomplishing objectives

Table 5.24 indicates that a satisfactory Cronbach's alpha of .872 was obtained for the *accomplishing objectives* scale. Inspection of the results showed that the item means ranged from 5.624 to 6.365 on a 7-point Likert scale, while the standard deviations ranged from .742 to 1.257. Although there were no extreme means, Object4 returned a standard deviation that was somewhat smaller than the other items (.742). It also appeared that there were no clear outliers in the distribution of squared multiple correlations or in the distribution of corrected item-total correlations. Relative to the mean inter-item correlation (.479), all of the inter-item correlations were satisfactory and above .35. No item consistently correlated lower with the remaining items of the scale. The moderate variability in the magnitude of the inter-item correlations was due to the fact that this scale was designed to assess different dimensions of *accomplishing objectives*. Furthermore, none of the items, if deleted, would have resulted in an increase in the Cronbach's alpha or bring about a distinctly smaller decrease in the variance of the scale. Since none of the evidence obtained caused great concern, all of the items were retained.

5.4.10.2. Accomplishing objectives dimensionality analysis

The assumption that the items follow a multivariate normal distribution in the parameter was not met as the null hypothesis had to be rejected (χ^2= 1066.702; p<.05). Normalisation of the data significantly improved the symmetry and kurtosis of the multivariate indicator variable distribution, however, the situation was not completely salvaged (χ^2= 257.767; p<.05). The normalised data was consequently analysed with RML estimation. The first-order *accomplishing objectives* measurement model is presented in Figure 5.17.

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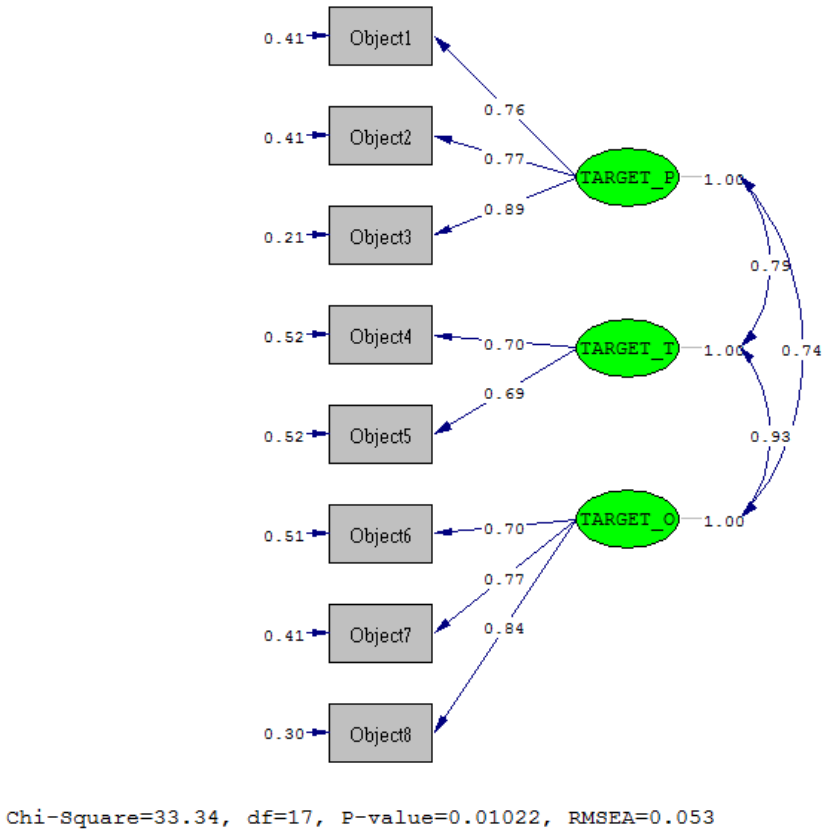

Figure 5.17. **First-order accomplishing objectives measurement model**

The null hypothesis that the first-order *accomplishing objectives* measurement model displays exact fit (χ^2= 33.336; p<.05) in the parameter was rejected. The sample RMSEA estimate was .053 and the close fit null hypothesis for the measurement model could not be rejected (p>.05). This suggested that the model displayed good fit on the sample data and that the model displayed close fit in the parameter.

Inspection of the unstandardised lambda-X matrix indicated that all the freed factor loadings were statistically significant (p<.05). In other words, all the items statistically significantly reflect the latent variables they were tasked to represent. Moreover, the R^2 values obtained ranged from .485 to .789. This suggested that at least 48% or more of the variance in each item could be explained by the factor associated with it.

The CFA results thus supports the fact that *accomplishing objectives,* as a two-dimensional construct, was successfully operationalised and that the scale can be considered a construct valid measure. The following section describes the psychometric evaluation of the scale that was developed to measure *applying specialist expertise.*

5.4.11. Applying specialist expertise

Applying specialist expertise is also a multidimensional construct and was measured with six items developed for the purpose of the current study. *Applying specialist expertise*

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includes *utilising/applying specialist expertise in the job*, *utilising/applying specialist expertise to assist others or the organisation* and *sharing expertise*. As with *accomplishing objectives,* it would have be impractical to perform an item analysis and EFA on only two items[60]. It was therefore decided to conduct an item analysis and a CFA on the entire scale.

5.4.11.1. Applying specialist expertise item analysis

Table 5.25 presents the item analysis results of the *applying specialist expertise* scale.

Table 5.25

Applying Specialist Expertise Item Analysis Results

Cronbach's alpha	Scale mean	Scale variance	Scale std. deviation	Average inter-item correlation	Items flagged	N of items
.834	36.3647	18.592	4.31187	.470	-	6

	Mean	Std. Deviation	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Expert1	5.7912	1.13949	30.5735	12.334	.620	.687	.807
Expert2	6.2147	.81165	30.1500	14.240	.603	.492	.810
Expert3	6.2824	.74646	30.0824	14.678	.587	.494	.815
Expert4	5.8206	1.16241	30.5441	12.166	.626	.688	.806
Expert5	6.0941	.98212	30.2706	12.930	.665	.620	.795
Expert6	6.1618	.91546	30.2029	13.690	.600	.624	.809

	Expertise_1	Expertise_2	Expertise_3	Expertise_4	Expertise_5	Expertise_6
Expert1	1.000	.415	.330	.816	.400	.276
Expert2	.415	1.000	.645	.347	.474	.493
Expert3	.330	.645	1.000	.337	.463	.550
Expert4	.816	.3.47	.337	1.000	.446	.307
Expert5	.400	.474	.463	.446	1.000	.751
Expert6	.276	.493	.550	.307	.751	1.000

Expert: applying specialist expertise

Table 5.25 indicates that a satisfactory alpha coefficient of .834 was obtained[61]. It is evident that there was an absence of extreme means, ranging from 5.791 to 6.282 on a 7-point Likert scale. However, Expert3 appeared to have a slightly smaller standard deviation (.746) relative to its colleagues. It also appeared that there were no clear outliers in the distribution of squared multiple correlations or in the distribution of corrected item-total correlations. No item consistently correlated lower with the remaining items of the scale. Again, it should be highlighted that the rather pronounced variability in the magnitude of the inter-item correlations overall was as a result of the scale's design intention, which was to measure

[60] It is acknowledged that these analysis problems should have been foreseen when the composite Psychological Ownership Questionnaire was compiled.

[61] It is acknowledged that this most likely represents an underestimate of the scale's reliability because the unidimensionality assumption made by Cronbach's alpha was most likely not met.

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relatively distinct latent dimensions associated with *applying specialist expertise.* Therefore, the low inter-item correlation (.276) between Expert1 and Exepert6 was not surprising. This is due to the fact that the former (Expert1) was designed to measure *applying/utilising specialist expertise,* whereas the latter (Expert6) was designed to measure *sharing expertise.* The evidence obtained was not overwhelmingly negative and all items were retained.

5.4.11.2. Applying specialist expertise dimensionality analysis

The null hypothesis that the items follow a multivariate normal distribution in the parameter had to be rejected (χ^2= 866.479; p<.05). An attempt at normalising the data using PRELIS improved the symmetry and kurtosis of the multivariate indicator variable distribution (χ^2= 240.965; p<.05), however, multivariate normality was still not achieved. Consequently, RML estimation was used to analyse the normalised data. The first-order *applying specialist expertise* measurement model is shown in Figure 5.18.

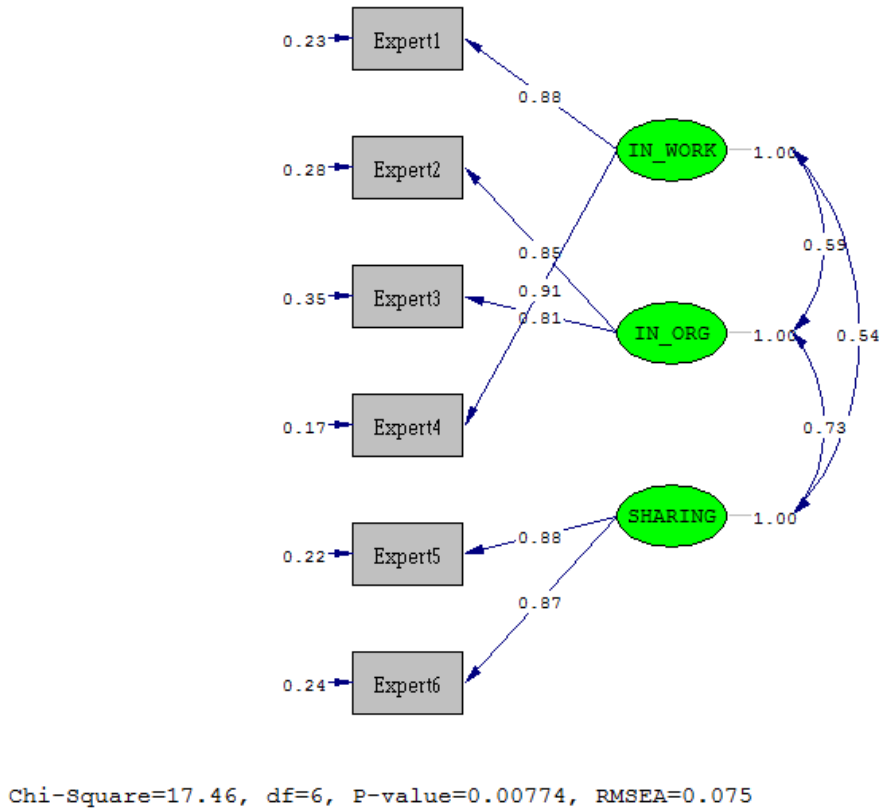

Figure 5.18. **First-order applying specialist expertise measurement model**

The null hypothesis that the first-order *applying specialist expertise* measurement model displays exact fit (χ^2= 17.457; p<.05) in the parameter was rejected. The sample RMSEA

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estimate was .075 and the close fit null hypothesis for the measurement model could not be rejected (p>.05). In other words, the model displayed close fit in the parameter[62].

The unstandardised lambda-X matrix revealed that all the freed factor loadings were statistically significant (p<.05). All the items thus statistically significantly reflect the latent variables they were earmarked to reflect. Lastly, the R^2 values obtained ranged from .649 to .833, which suggested that at least 50% of the variance in each item could be explained by the factor linked to it. Given the CFA results, it is therefore permissible to conclude that as a construct, *applying specialist expertise* was successfully operationalised and that the scale can be considered a construct valid measure thereof.

5.5. DATA SCREENING PRIOR TO FITTING THE PSYCHOLOGICAL OWNERSHIP MEASUREMENT MODEL AND COMPREHENSIVE LISREL MODEL

The question regarding how to operationalise the latent variables in a structural model has been controversial for quite some time (Little *et al.,* 2002). The scientific ideal according to some scholars (Bandalos, 2002; Marsh, Lüdtke, Nagengast, Morin & Von Davier, 2013) would be that the items of each scale serve as manifest or indicator variables of the latent variables that comprise the *psychological ownership* model. This, however, would results in a rather cumbersome and complex model. In order to address this problem and operationalise the latent variables in a way that reduces the model complexity, each latent variable was represented by two item parcels.

It should be highlighted that since the earliest use of factor analysis and SEM, the use of item parcels has been a matter of debate. However, some scholars argue that the use of item parcels has several key advantages. Little *et al*. (2013) suggest that parcels (as opposed to the items) have higher reliability, greater communality, lower likelihood of distributional violations, higher ratio of common-to-unique factor variance, and more, tighter and more-equal intervals. They also state that models with parcels have reduced source of sampling error, lower likelihood of correlated residuals and dual factor loadings, lower indicator-to-sample size ratio, and fewer parameter estimates. For the current study, the item parcels were created by taking the mean of sum of the even and the uneven numbered items of each scale. A total of 26 item parcels were thus formed and used to fit the *psychological ownership* measurement and structural model. Since Belong4 was removed from the *salient root needs* scale during the dimensionality analysis, it was not included in the item parcel calculation. Nevertheless, all the other scales' items were included.

[62] Again, the low statistical power due to the small degrees of freedom (six) relative to the sample size (340) should be taken into consideration when interpreting this finding.

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Prior to fitting the *psychological ownership* measurement and comprehensive LISREL model, data screening was undertaken. As explained in paragraph 3.7.4.2, PRELIS was used to evaluate the univariate and multivariate normality of the composite indicator variables (Jöreskog & Sörbom, 1996). The univariate normality test, which examines each variable individually for departure from normality (Diamantopoulos & Siguaw, 2000) had to be rejected ($p<.05$) for all 26 indicator variables. The results of the initial test of multivariate normality are shown in Table 5.26.

Table 5.26

Test of Multivariate Normality before Normalisation

Skewness			Kurtosis			Skewness and Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
126.735	36.318	0.000	890.706	18.875	0.000	1675.305	0.000

It is evident that the null hypothesis of multivariate normality had to be rejected ($p<.05$) for the multivariate indicator variables distribution, corroborating the univariate findings. In order to satisfy the multivariate assumption made by ML estimation, an attempt at normalising the data returned the output shown in Table 5.27.

Table 5.27

Test of Multivariate Normality after Normalisation

Skewness			Kurtosis			Skewness and Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
90.683	19.666	0.000	824.229	14.221	0.000	588.987	0.000

In terms of univariate normality, even though normalisation of the data succeeded in increasing the p-values for all 26 composite indicator variables, 10 still failed the test of univariate normality ($p<.05$). Furthermore, Table 5.27 indicates that the attempt to normalise the data improved the symmetry and kurtosis of the multivariate indicator variable distribution, but did not completely salvage the situation as multivariate normality was still not achieved ($p<.05$). RML estimation was consequently used to analyse the normalised data.

5.6. FITTING THE PSYCHOLOGICAL OWNERSHIP MEASUREMENT MODEL

As explained in paragraph 3.7.4, the comprehensive LISREL model is composed of two sub-models, namely the measurement model and the structural model. The measurement model describes how each latent variable is operationalised by composite indicators and once fitted, provides information about the reliabilities and validities of the observed composite indicators. The structural model, on the other hand, describes the relationships that have been hypothesised to exist between the latent variables themselves

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(Diamantopoulos & Siguaw, 2000). In order to determine the success of the operationalisation of the latent variables included in the structural model, the *psychological ownership* measurement model had to be tested (via CFA) prior to testing the *psychological ownership* structural model. Operationalisation of the latent variables included in the structural model was considered successful if:

- The measurement model showed close fit (i.e., the close fit null hypothesis was not rejected);
- The unstandardised factor loadings were statistically significant[63] ($p<.05$);
- The completely standardised factor loadings were large ($\lambda_{jk} \geq .71$);
- The unstandardised measurement error variances were statistically significant ($p<.05$);
- The completely standardised measurement error variances were small ($\theta_{\delta jj} \leq .50$);
- The inter-latent variable correlations were not excessively large or did not approach unity (i.e., evidence of discriminant validity; $\phi_{jk} \leq .90$); and
- The R^2 values for indicator variables were large (>.50).

The *psychological ownership* measurement model results reported by LISREL are presented and interpreted in the following section.

5.6.1. Evaluating the psychological ownership measurement model fit

When testing the success of the operationalisation of the latent variables that comprise the structural model, a single exogenous measurement model was assumed. The distinction between endogenous and exogenous measurement models was consequently ignored. The *psychological ownership* measurement model converged in 9 iterations. The fitted measurement model is depicted as a path diagram in Figure 5.19.

[63] A critical value of 1.6449 was used to evaluate the statistical significance of the factor loading estimates, error variances and the latent variable correlations because the alternative hypotheses have all been formulated as directional hypotheses in paragraph 3.7.4.3.

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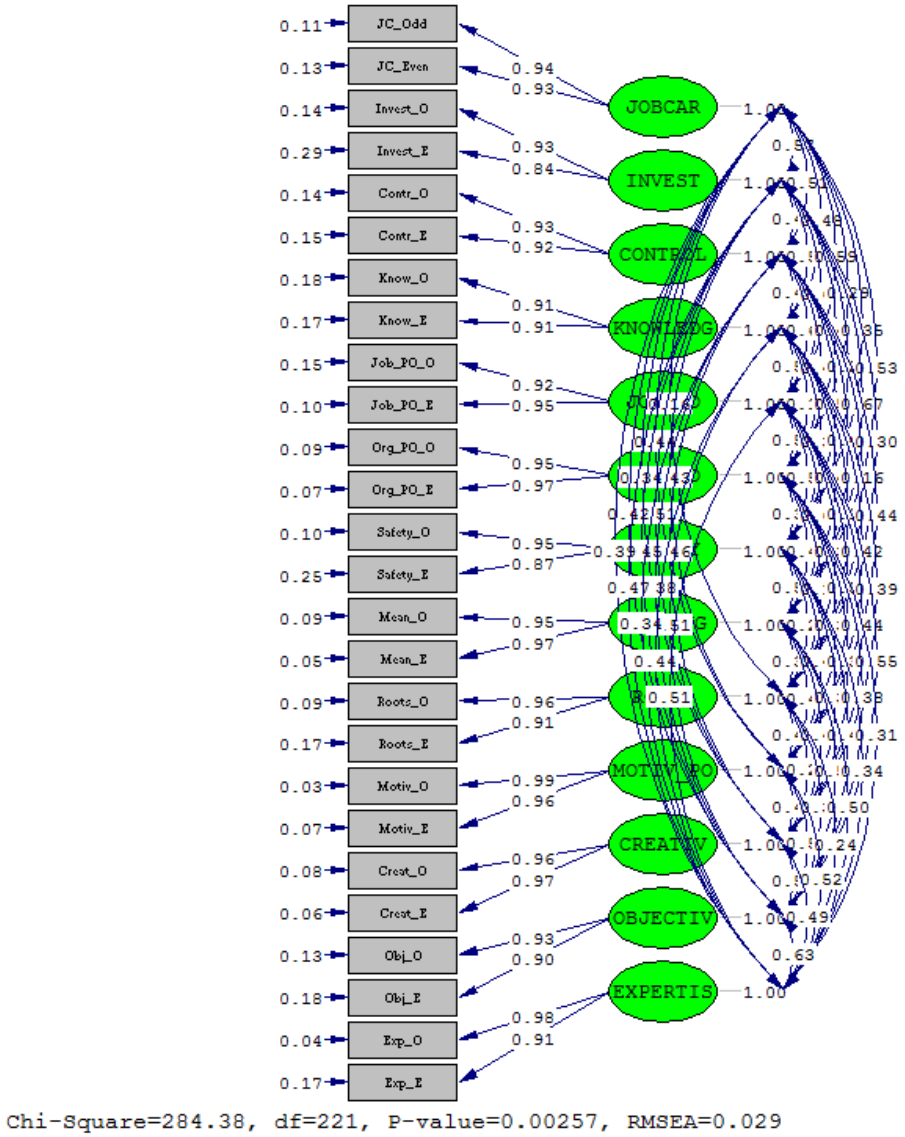

Figure 5.19. **Psychological ownership measurement model (completely standardised solution)**

Table 5.28 outlines the full array of model fit indices reported by LISREL.

Table 5.28

Goodness of Fit Statistics for the Psychological Ownership Measurement Model

Degrees of Freedom = 221
Minimum Fit Function Chi-Square = 321.4708 (P = 0.0000)
Normal Theory Weighted Least Squares Chi-Square = 319.4712 (P = 0.0000)
Satorra-Bentler Scaled Chi-Square = 284.3803 (P = 0.002572)
Chi-Square Corrected for Non-Normality = 691.3653 (P = 0.0)
Estimated Non-centrality Parameter (NCP) = 63.3803
90 Percent Confidence Interval for NCP = (24.0252 ; 110.8632)
Minimum Fit Function Value = 0.9483
Population Discrepancy Function Value (F0) = 0.1870
90 Percent Confidence Interval for F0 = (0.07087 ; 0.3270)
Root Mean Square Error of Approximation (RMSEA) = 0.02909
90 Percent Confidence Interval for RMSEA = (0.01791 ; 0.03847)
P-Value for Test of Close Fit (RMSEA < 0.05) = 1.00

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Table 5.28

Goodness of Fit Statistics for the Psychological Ownership Measurement Model (continued)

Expected Cross-Validation Index (ECVI) = 1.6058
90 Percent Confidence Interval for ECVI = (1.4897 ; 1.7459)
ECVI for Saturated Model = 2.0708
ECVI for Independence Model = 56.5901
Chi-Square for Independence Model with 325 Degrees of Freedom = 19132.0403
Independence AIC = 19184.0403
Model AIC = 544.3803
Saturated AIC = 702.0000
Independence CAIC = 19309.5929
Model CAIC = 1172.1432
Saturated CAIC = 2396.9599
Normed Fit Index (NFI) = 0.9851
Non-Normed Fit Index (NNFI) = 0.9950
Parsimony Normed Fit Index (PNFI) = 0.6699
Comparative Fit Index (CFI) = 0.9966
Incremental Fit Index (IFI) = 0.9966
Relative Fit Index (RFI) = 0.9781
Critical N (CN) = 326.2297
Root Mean Square Residual (RMR) = 0.02461
Standardized RMR = 0.01936
Goodness of Fit Index (GFI) = 0.9324
Adjusted Goodness of Fit Index (AGFI) = 0.8926
Parsimony Goodness of Fit Index (PGFI) = 0.5871

The fit of the measurement model was evaluated by testing the statistical null hypothesis of exact (H_{025a}) and close fit (H_{025b}) that were formulated in Chapter 3. The null hypothesis that the model fits the population data exactly, was tested with the following statistical hypothesis:

$H_{025a:}$ RMSEA = 0

$H_{a25a:}$ RMSEA > 0

Table 5.28 indicates that the exact fit null hypothesis, tested by the Satorra-Bentler scaled chi-square (χ^2= 284.38; p<.05) had to be rejected. In other words, it was permissible to conclude that this model did not display exact fit in the parameter. This finding came as no surprise as the χ^2 test statistic is very sensitive to sample size. Nevertheless, for a reasonable sample size a χ^2 roughly equal to its *df* (221), is an instant definition of satisfactory fit (Loehlin & Beaujean, 2017), which appeared to be the case with the *psychological ownership* measurement model. The more realistic hypothesis of close fit was tested with the following statistical hypothesis:

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$H_{025b:}$ RMSEA ≤ .05

$H_{a25b:}$ RMSEA > .05

The sample RMSEA estimate was .029, which indicated excellent measurement model fit in the sample. The close fit null hypothesis for the measurement model could not be rejected (p>.05). In other words, it was permissible to hold the position that the model displayed close fit in the parameter. Other goodness of fit indices[64] corroborated the latter finding. For example, both the goodness-of-fit statistics (GFI; >.90) and the comparative fit index (CFI; >.95) pointed towards good fit. The standardised root mean square residual (SRMR) also appeared to be below .05, which indicated that the residuals on average were satisfactory small. Loehlin and Beaujean (2017) caution against being blinded by goodness-of-fit indices as the only manner to evaluate the fit of a model. They highlight the importance of inspecting the residuals as the smallness of the residuals provide an absolute sense of the goodness of fit, while larger residuals can suggest which aspects of the data are least well captured by the model. In addition to evaluating the number of small and large standardised residuals, it is also important to consider their shape and distribution. Table 5.29 provides a summary of the standardised residuals.

Table 5.29

Summary Statistics for the Standardised Residuals

Summary statistics	Value
Smallest Standardized Residual	-24.5043
Median Standardized Residual	0.0000
Largest Standardized Residual	127.9066

The distribution of the standardised residuals is shown in Figure 5.20. In order to support the finding of close fit, the spread of the residuals should be dispersed reasonably symmetrical around zero. Figure 5.20 reveals one large negative and one large positive outlier. Furthermore, the distribution appears to be slightly positively skewed (i.e., the negative residuals tended to dominate and the long leg of the distribution stretched to the right), which suggests that the model parameters were more inclined to overestimate the observed variance and covariance terms rather than to underestimate them. Nevertheless, the stem-and-leaf plot provides adequate evidence of good fit.

[64] The GFI is known as an absolute fit index that indicates the relevant amount of variance and covariances accounted for the by the model. It thus demonstrates how closely the model comes to perfectly reproducing the observed covariance matrix. The CFI, on the other hand, is known as a relative fit index that show "how much better the model fits compared to a baseline model, usually the independence model" (Diamantopoulos & Siguaw, 2000, p. 8). Lastly, the SRMR provides an overall average of the size of the residuals. Small residuals below a value of .05 are considered satisfactory and indicative of acceptable fit (Loehlin & Beaujean, 2017).

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```
- 2|5
- 1|2
- 0|5433333322222222222111111111111111111111111111111111111111111111111111111111111+97
  0|111111111111111111111111111111111111112222222222222222334577
  1|
  2|8
  3|
  4|
  5|
  6|
  7|
  8|
  9|
 10|
 11|
 12|8
```

Figure 5.20. **Stem-and-leaf plot of the standardised residuals**

Table 5.30 shows the largest negative and largest positive standardised residuals.

Table 5.30

Largest Negative and Largest Positive Standardised Residuals

Largest Negative Standardized Residuals	
Residual for Know_O and Invest_O	-5.3750
Residual for Know_E and JC_Odd	-2.6654
Residual for Know_E and Contr_O	-2.8509
Residual for Job_PO_E and Invest_E	-24.5043
Residual for Mean_O and Contr_O	-3.3375
Residual for Mean_O and Job_PO_E	-4.0680
Residual for Creat_E and Invest_O	-2.8983
Residual for Obj_E and Mean_E	-3.2887
Residual for Exp_E and Know_O	-12.0782
Largest Positive Standardized Residuals	
Residual for Know_E and JC_Even	6.9700
Residual for Safety_O and Job_PO_O	5.4133
Residual for Safety_E and Contr_O	3.9444
Residual for Motiv_O and Org_PO_O	7.2734
Residual for Obj_O and Org_PO_O	127.9066
Residual for Exp_O and Know_E	28.2926
Residual for Exp_E and Know_E	2.8505

Table 5.30 indicates that there were nine extreme negative residuals and seven extreme positive residuals larger than |2.58|. In other words, there were 16 extreme standardised residuals (16/351[65]= 4.56%). The fitted measurement model thus succeeded in accurately reproducing 335 of the 351 unique variance and covariances in the observed sample covariance matrix. This small percentage of large standardised residuals therefore supports the finding of favourable measurement model fit.

[65] [26 x (26 + 1)] / 2 = 351.

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As part of the evaluation measurement model fit, the modification indices were also examined. More specifically, the modification indices for the factor loading matrix (Λ^{x}) and the error variance-covariance matrix (Θ_{δ}) were calculated as these were of particular interest. Although these data-driven suggestions indicate the parameters that should be set free in order to improve model fit, actual changes or modifications to the model should make sense from a theoretical and substantive point of view (Diamantopoulos & Siguaw, 2000). Moreover, in the current study, the modification indices calculated for the factor loading matrix Λ^{x} and the error variance-covariance matrix Θ_{δ} were examined purely to gain additional insight into the model fit.

Inspection of the modification indices for lambda-X revealed that 13 of the 312[66] original fixed factor loadings were statistically significant[67] (<.01). In other words, the percentage of large modification indices was only 4.17%. In terms of theta-delta, six of the 325[68] modification indices calculated for the fixed covariances in the Θ_{δ} matrix were statistically significant (<.01). This means that the percentage of large modification indices was only 1.85%. The evidence in support of the measurement model close fit thus justified the interpretation of various measurement model parameter estimates. The following section examines the freed measurement model parameter estimates reported by the the factor loading matrix Λ^{x}, the error variance-covariance matrix Θ_{δ} and the latent variable variance-covariance matrix Φ, as well as the R^2 for the (X) indicator variables.

5.6.2. Examining the measurement model parameter estimates

In both the unstandardised and completely standardised solution of the lambda-X matrix, the factor loadings represent the slope of the regression of the item parcels on the latent variables. However, in the completely standardised solution, these regression slopes (λ_{jk}) reflect that average change in the indicator (X_j) associated with one standard deviation change in the latent variable (ξ_k). In other words, in the completely standardised solution both the item parcels (indicators) and latent variables have been standardised to a z-score and are interpreted accordingly. In the unstandardised solution, on the other hand, both the item parcels and the latent variables are expressed in their original metric. The unstandardised lambda-X matrix is shown in Table 5.31, while the completely standardised lambda-X is shown in Table 5.32.

---

[66] (26 x 13) – 26 = 312. Where there are 26 item parcels and 13 latent variables (operationalised by two item parcels).
[67] Modification indices larger than 6.6449 were considered 'large' at the 1% significance level.
[68] [26 x (26 - 1)] / 2 = 325. Where there are 26 item parcels.

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Table 5.31

Unstandardised Lambda-X Matrix

	JC	INVEST	CONTROL	KNOW	JOB_PO	ORG_PO
JC_Odd	0.9191*	- -				
	(.0412)					
	22.2924					
JC_Even	0.9811*	- -	- -	- -	- -	- -
	(.0435)					
	22.5623					
Invest_O	- -	1.0106*	- -	- -	- -	- -
		(.0432)				
		23.4059				
Invest_E	- -	1.0473*	- -	- -	- -	- -
		(.0531)				
		19.7075				
Contr_O	- -	- -	1.1961*	- -	- -	- -
			(.0552)			
			21.6845			
Contr_E	- -	- -	1.3316*	- -	- -	- -
			(.0584)			
			22.7924			
Know_O	- -	- -	- -	0.9797*	- -	- -
				(.0456)		
				21.4960		
Know_E	- -	- -	- -	0.9647*	- -	- -
				(.0467)		
				20.6785		
Job_PO_O	- -	- -	- -	- -	1.1638*	- -
					(.0481)	
					24.1839	
Job_PO_E	- -	- -	- -	- -	1.2871*	- -
					(.0536)	
					24.0184	
Org_PO_O	- -	- -	- -	- -	- -	1.7116*
						(.0672)
						25.4673
Org_PO_E	- -	- -	- -	- -	- -	1.6787*
						(.0665)
						25.2567

* (p<.05)

JC: job characteristics; INVEST: self-investment route; CONTROL: control of the job route; KNOW: intimate knowledge route; JOB_PO: job-based psychological ownership; ORG_PO: organisation-based psychological ownership

JC: job characteristics; Invest: self-investment route; Contr: control of the job route; Know: intimate knowledge route; Job_PO: job-based psychological ownership; Org_PO: organisation-based psychological ownership; Safety: psychological safety; Mean: psychological meaningfulness; Roots: salient root needs; Motiv: motivation to pursue the routes; Creat: employee creativity and entrepreneurial behaviour; Obj: accomplishing objectives; Exp: applying specialist expertise

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Table 5.31

Unstandardised Lambda-X Matrix (continued)

	SAFETY	MEANING	ROOTS	MOTIV	CREATIV	OBJECTIV	EXPERT
Safety_O	0.8494* (.0387) 21.9422	- -	- -	- -	- -	- -	- -
Safety_E	0.8535* (.0409) 20.8642	- -	- -	- -	- -	- -	- -
Mean_O	- -	0.8126* (.0319) 25.5067	- -	- -	- -	- -	- -
Mean_E	- -	0.8475* (.0305) 27.8199	- -	- -	- -	- -	- -
Roots_O	- -	- -	0.7724* (.0363) 21.3016	- -	- -	- -	- -
Roots_E	- -	- -	0.7038* (.0349) 20.1392	- -	- -	- -	- -
Motiv_O	- -	- -	- -	0.8409* (.0329) 25.5383	- -	- -	- -
Motiv_E	- -	- -	- -	0.8245* (.0335) 24.5906	- -	- -	- -
Creat_O	- -	- -	- -	- -	1.0583* (.0458) 23.1297	- -	- -
Creat_E	- -	- -	- -	- -	1.1000* (.0457) 24.0921	- -	- -
Obj_O	- -	- -	- -	- -	- -	0.7617* (.0338) 22.5467	- -
Obj_E	- -	- -	- -	- -	- -	0.6682* (.0309) 21.6107	- -
Exp_O	- -	- -	- -	- -	- -	- -	0.7258* (.0278) 26.1111
Exp_E	- -	- -	- -	- -	- -	- -	0.6709* (.0286) 23.4630

* (p<.05)

SAFETY: psychological safety; MEANING: psychological meaningfulness; ROOTS: salient root needs; MOTIV: motivation to pursue the routes; CREATIV: employee creativity and entrepreneurial behaviour; OBJECTIV: accomplishing objectives; EXPERT: applying specialist expertise

JC: job characteristics; Invest: self-investment route; Contr: control of the job route; Know: intimate knowledge route; Job_PO: job-based psychological ownership; Org_PO: organisation-based psychological ownership; Safety: psychological safety; Mean: psychological meaningfulness; Roots: salient root needs; Motiv: motivation to pursue the routes; Creat: employee creativity and entrepreneurial behaviour; Obj: accomplishing objectives; Exp: applying specialist expertise

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Table 5.32

Completely Standardised Lambda-X Matrix

	JC	INVEST	CONTROL	KNOW	JOB_PO	ORG_PO	SAFETY	MEANING	ROOTS	MOTIV	CREATIV	OBJECTIV	EXPERT
JC_Odd	.9437	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
JC_Even	.9326	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Invest_O	- -	.9299	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Invest_E	- -	.8410	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Contr_O	- -	- -	.9274	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Contr_E	- -	- -	.9196	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Know_O	- -	- -	- -	.9057	- -	- -	- -	- -	- -	- -	- -	- -	- -
Know_E	- -	- -	- -	.9091	- -	- -	- -	- -	- -	- -	- -	- -	- -
JobPO_O	- -	- -	- -	- -	.9197	- -	- -	- -	- -	- -	- -	- -	- -
JobPO_E	- -	- -	- -	- -	.9492	- -	- -	- -	- -	- -	- -	- -	- -
OrgPO_O	- -	- -	- -	- -	- -	.9516	- -	- -	- -	- -	- -	- -	- -
OrgPO_E	- -	- -	- -	- -	- -	.9668	- -	- -	- -	- -	- -	- -	- -
Safety_O	- -	- -	- -	- -	- -	- -	.9504	- -	- -	- -	- -	- -	- -
Safety_E	- -	- -	- -	- -	- -	- -	.8679	- -	- -	- -	- -	- -	- -
Mean_O	- -	- -	- -	- -	- -	- -	- -	.9535	- -	- -	- -	- -	- -
Mean_E	- -	- -	- -	- -	- -	- -	- -	.9747	- -	- -	- -	- -	- -
Roots_O	- -	- -	- -	- -	- -	- -	- -	- -	.9553	- -	- -	- -	- -
Roots_E	- -	- -	- -	- -	- -	- -	- -	- -	.9110	- -	- -	- -	- -
Motiv_O	- -	- -	- -	- -	- -	- -	- -	- -	- -	.9862	- -	- -	- -
Motiv_E	- -	- -	- -	- -	- -	- -	- -	- -	- -	.9634	- -	- -	- -
Creat_O	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	.9584	- -	- -
Creat_E	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	.9688	- -	- -
Obj_O	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	.9332	- -
Obj_E	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	.9043	- -
Exp_O	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	.9783
Exp_E	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	.9101

JC: job characteristics; INVEST: self-investment route; CONTROL: control of the job route; KNOW: intimate knowledge route; JOB_PO: job-based psychological ownership; ORG_PO: organisation-based psychological ownership; SAFETY: psychological safety; MEANING: psychological meaningfulness; ROOTS: salient root needs; MOTIV: motivation to pursue the routes; CREATIV: employee creativity and entrepreneurial behaviour; OBJECTIV: accomplishing objectives; EXPERT: applying specialist expertise

JC: job characteristics; Invest: self-investment route; Contr: control of the job route; Know: intimate knowledge route; Job_PO: job-based psychological ownership; Org_PO: organisation-based psychological ownership; Safety: psychological safety; Mean: psychological meaningfulness; Roots: salient root needs; Motiv: motivation to pursue the routes; Creat: employee creativity and entrepreneurial behaviour; Obj: accomplishing objectives; Exp: applying specialist expertise

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The factor loading estimates were interpreted by testing the following hypotheses:

H_{0i}: $\lambda_{jk} = 0$; i=26, 27, …, 51; j=1, 2, …, 26; k=1, 2, …, 13

H_{ai}: $\lambda_{jk} \neq 0$; i=26, 27, ..., 51; j=1, 2, …, 26; k=1, 2, …, 13

Inspection of the unstandardised lambda-X matrix (Table 5.31) reveals that all the factor loading estimates were statistically significant ($p<.05$). In other words, H_{0i}: $\lambda_{jk} = 0$ was therefore rejected for all i= 26 to 51. It can thus be assumed that all item parcels statistically significantly reflect the latent variables they were tasked to represent.

The completely standardised lambda-X matrix is shown in Table 5.32. The completely standardised factor loadings range between .841 and .986 and no inadmissible values were returned. Table 5.32 indicates that all of the 26 indicators loaded satisfactory ($\lambda_{jk} \geq .71$) onto the latent variables they were earmarked to reflect.

The squared multiple correlations, R^2, for the indicator variables are shown in Table 5.33. The R^2 indicates the amount of variance in the indicator variable accounted for by the latent variable(s) linked to it in the measurement model.

Table 5.33

Squared Multiple Correlations for X-variables

JC_Odd	JC_Even	Invest_O	Invest_E	Contr_O	Contr_E	Know_O
.8906	.8698	.8646	.7072	.8601	.8456	.8202
Know_E	**Job_PO_O**	**Job_PO_E**	**Org_PO_O**	**Org_PO_E**	**Safety_O**	**Safety_E**
.8265	.8459	.9009	.9055	.9346	.9032	.7533
Mean_O	**Mean_E**	**Roots_O**	**Roots_E**	**Motiv_O**	**Motiv_E**	**Creat_O**
.9092	.9500	.9125	.8298	.9726	.9282	.9186
Creat_E	**Obj_O**	**Obj_E**	**Exp_O**	**Exp_E**		
.9386	.8708	.8177	.9571	.8283		

JC: job characteristics; Invest: self-investment route; Contr: control of the job route; Know: intimate knowledge route; Job_PO: job-based psychological ownership; Org_PO: organisation-based psychological ownership; Safety: psychological safety; Mean: psychological meaningfulness; Roots: salient root needs; Motiv: motivation to pursue the routes; Creat: employee creativity and entrepreneurial behaviour; Obj: accomplishing objectives; Exp: applying specialist expertise

The R^2 values obtained ranged from .707 (Invest_E) to .973 (Motiv_O). This suggests that more than 70% of the variance in the item parcels can be explained by the latent variables they were designed to reflect. While the squared multiple correlation are indicative of the degree to which the indicators are free from measurement error, the unstandardised theta-delta matrix (Table 5.34) indicates the extent to which the indicators were plagued with systematic and random error.

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Table 5.34

Unstandardised Theta-Delta Matrix

JC_Odd	JC_Even	Invest_O	Invest_E	Contr_O	Contr_E	Know_O
0.1038*	0.1441*	0.1599*	0.4540*	0.2328*	0.3237*	0.2104*
(.0254)	(.0269)	(.0395)	(.0577)	(.0552)	(.0515)	(.0513)
4.0937	5.3592	4.0456	7.8657	4.2147	6.2899	4.1044
Know_E	**Job_PO_O**	**Job_PO_E**	**Org_PO_O**	**Org_PO_E**	**Safety_O**	**Safety_E**
0.1953*	0.2468*	0.1821*	0.3056*	0.1971*	0.0773*	0.2386*
(.0452)	(.0475)	(.0589)	(.0935)	(.0899)	(.0373)	(.0399)
4.3162	5.1938	3.0947	3.2691	2.1928	2.0738	5.9758
Mean_O	**Mean_E**	**Roots_O**	**Roots_E**	**Motiv_O**	**Motiv_E**	**Creat_O**
0.0659*	0.0378*	0.0572*	0.1016*	**0.0199**	0.0526*	0.0993*
(.0163)	(.0123)	(.0312)	(.0280)	(.0138)	(.0140)	(.0308)
4.0564	3.0722	1.8344	3.6271	1.4459	3.7449	3.2285
Creat_E	**Obj_O**	**Obj_E**	**Exp_O**	**Exp_E**		
0.0791*	0.0861*	0.0995*	**0.0236**	0.0933*		
(.0340)	(.0212)	(.0179)	(.0152)	(.0172)		
2.3310	4.0602	5.5461	1.5597	5.4202		

* (p<.05)

JC: job characteristics; Invest: self-investment route; Contr: control of the job route; Know: intimate knowledge route; Job_PO: job-based psychological ownership; Org_PO: organisation-based psychological ownership; Safety: psychological safety; Mean: psychological meaningfulness; Roots: salient root needs; Motiv: motivation to pursue the routes; Creat: employee creativity and entrepreneurial behaviour; Obj: accomplishing objectives; Exp: applying specialist expertise

The measurement error estimates were interpreted by testing the following hypotheses:

H_{0i}: $\theta_{\delta jj} = 0$; i=52, 53, ..., 77; j=1, 2, ..., 26

H_{ai}: $\theta_{\delta jj} > 0$; i=52, 53, ..., 77; j=1, 2, ..., 26

Table 5.34 indicates that all the measurement error variances were statistically significant (p<.05), with the exception of Motiv_O and Exp_O. In other words, H_{0i}: $\theta_{\delta jj} = 0$ could be rejected (p<.05) for all i, except for i=70 and i=76; j=19 and j=25. This means that all but the latter two indicators were statistically significantly (p<.05) plagued by measurement error. There was, therefore, not sufficient grounds to question the position that in the parameter (but not in the sample) Motiv_O and Exp_O provided perfectly reliable and valid measures of the latent variables they were earmarked to reflect. Despite the desirability of perfectly reliable and valid measures, actually attaining it, nonetheless, provides reason for concern simply because infallible measurement is generally accepted as an unattainable ideal. The completely standardised theta-delta matrix is shown in Table 5.35.

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Table 5.35

Completely Standardised Theta-Delta Matrix

JC_Odd	JC_Even	Invest_O	Invest_E	Contr_O	Contr_E	Know_O
.1094	.1302	.1354	.2928	.1399	.1544	.1798
Know_E	**Job_PO_O**	**Job_PO_E**	**Org_PO_O**	**Org_PO_E**	**Safety_O**	**Safety_E**
.1735	.1541	.0991	.0945	.0654	.0968	.2467
Mean_O	**Mean_E**	**Roots_O**	**Roots_E**	**Motiv_O**	**Motiv_E**	**Creat_O**
.0908	.0500	.0875	.1702	.0274	.0718	.0814
Creat_E	**Obj_O**	**Obj_E**	**Exp_O**	**Exp_E**		
.0614	.1292	.1823	.0429	.1717		

JC: job characteristics; Invest: self-investment route; Contr: control of the job route; Know: intimate knowledge route; Job_PO: job-based psychological ownership; Org_PO: organisation-based psychological ownership; Safety: psychological safety; Mean: psychological meaningfulness; Roots: salient root needs; Motiv: motivation to pursue the routes; Creat: employee creativity and entrepreneurial behaviour; Obj: accomplishing objectives; Exp: applying specialist expertise

Table 5.35 indicates that none of the standardised measurement error variances had inadmissible values. The completely standardised measurement error variances for all the indicators were small ($\theta_{\delta jj} \leq .50$), suggesting that (substantially) less than 50% of the variance in the indicators was due to measurement error. Taking both the measurement error and R^2 evidence into consideration, it can thus be argued that the composite indicators that were formed to reflect the latent variables comprising the *psychological ownership* structural model displayed satisfactory validity.

Lastly, it is also important to examine the discriminant validity of the indicator variables as part of the measurement model fit. Discriminant validity is demonstrated when the measures of a construct can be distinguished from, and do not correlate excessively with the measures of a related, but qualitatively distinct construct (Foxcroft & Roodt, 2013). It is determined by inspecting the inter-correlations between latent variables depicted in the phi matrix (Table 5.36). The correlation estimates between the latent variables were interpreted by testing the following hypotheses:

H_{0i}: $\phi_{jk} = 0$; i=78, 79, ..., 155; j=1, 2, ..., 13; k=1, 2, ..., 13; $j \neq k$

H_{ai}: $\phi_{jk} > 0$; i=78, 79, ..., 155; j=1, 2, ..., 13; k=1, 2, ..., 13; $j \neq k$

It is evident that all the latent variables inter-correlations were statistically significant ($p<.05$) and that H_{0i}: $\phi_{jk} = 0$ could be rejected for all i=78, 79, ..., 155; j=1, 2, ..., 13; k=1, 2, ..., 13. Since none of the correlations were excessively large ($\phi_{jk} \leq .90$), discriminant validity therefore did not seem to be a problem. Since no ϕ_{jk} even exceeded .70, it was not considered necessary to employ more stringent tests of discriminant validity, such as the calculation of 95% confidence intervals for the 78 ϕ_{jk} estimates (Bagozzi, Yi & Phillips, 1991;

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Mels, 2010) or the calculation of the average variance extracted (AVE) for every latent variable (Farrell, 2010)[69].

Table 5.36

Unstandardised Phi Matrix

	JC	INVEST	CONTROL	KNOW	JOB_PO	ORG_PO
JC	1.0000					
INVEST	0.5745	1.0000				
	(.0447)					
	12.8490					
CONTROL	0.5138	0.4238	1.0000			
	(.0533)	(.0534)				
	9.6442	7.9373				
KNOW	0.4781	0.5450	0.4442	1.0000		
	(.0499)	(.0484)	(.0508)			
	9.5818	11.2492	8.7362			
JOB_PO	0.5921	0.6158	0.6134	0.5838	1.0000	
	(.0452)	(.0420)	(.0422)	(.0441)		
	13.0942	14.6462	14.5384	13.2414		
ORG_PO	0.2934	0.4122	0.4494	0.1332	0.5096	1.0000
	(.0574)	(.0494)	(.0548)	(.0576)	(.0423)	
	5.1076	8.3354	8.2040	2.3129	12.0579	
SAFETY	0.3506	0.2707	0.5629	0.2968	0.5254	0.3237
	(.0575)	(.0619)	(.0428)	(.0558)	(.0481)	(.0550)
	6.0958	4.3731	13.1597	5.3214	10.9320	5.8899
MEANING	0.5253	0.6707	0.4644	0.4507	0.6668	0.4228
	(.0434)	(.0360)	(.0491)	(.0480)	(.0381)	(.0499)
	12.1088	18.6244	9.4615	9.3865	17.5055	8.4809
ROOTS	0.1648	0.3039	0.1634	0.1782	0.3114	0.1618
	(.0596)	(.0603)	(.0624)	(.0644)	(.0601)	(.0578)
	2.7667	5.0412	2.6194	2.7679	5.1818	2.7992
MOTIV	0.4433	0.4347	0.4437	0.4201	0.5080	0.3370
	(.0524)	(.0543)	(.0490)	(.0553)	(.0462)	(.0505)
	8.4625	8.0100	9.0629	7.5905	11.0061	6.6744
CREATIV	0.3410	0.5110	0.4638	0.3921	0.4424	0.3899
	(.0603)	(.0521)	(.0521)	(.0528)	(.0561)	(.0551)
	5.6534	9.8088	8.9028	7.4269	7.8891	7.0759
OBJECTIV	0.4194	0.4507	0.3783	0.5118	0.5483	0.3777
	(.0523)	(.0564)	(.0544)	(.0500)	(.0442)	(.0502)
	8.0151	7.9856	6.9563	10.2272	12.4078	7.5160
EXPERT	0.3932	0.4697	0.3377	0.4435	0.5149	0.3085
	(.0547)	(.0547)	(.0560)	(.0490)	(.0466)	(.0507)
	7.1864	8.5796	6.0257	9.0461	11.0580	6.0892

JC: job characteristics; INVEST: self-investment route; CONTROL: control of the job route; KNOW: intimate knowledge route; JOB_PO: job-based psychological ownership; ORG_PO: organisation-based psychological ownership; CREATIV: employee creativity and entrepreneurial behaviour; EXPERT: applying specialist expertise

[69] According to Farrell (2010) the AVE for ξ_i and ξ_j should be greater than .50, and should be greater than the squared correlation between the latent variables ξ_i and ξ_j. He argued that ξ_i and ξ_j should account for more variance in their indicator variables that were tasked to reflect them than measurement error does or than they explain in each other.

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Table 5.36

Unstandardised Phi Matrix (continued)

	SAFETY	MEANING	ROOTS	MOTIV	CREATIV	OBJECTIV	EXPERT
SAFETY	1.0000						
MEANING	0.5003	1.0000					
	(.0502)						
	9.9562						
ROOTS	0.2473	0.3432	1.0000				
	(.0584)	(.0572)					
	4.2336	5.9981					
MOTIV	0.4662	0.4490	0.4334	1.0000			
	(.0509)	(.0479)	(.0471)				
	9.1671	9.3787	9.1919				
CREATIV	0.3459	0.4846	0.2527	0.4275	1.0000		
	(.0591)	(.0479)	(.0590)	(.0563)			
	5.8551	10.1119	4.2822	7.6007			
OBJECTIV	0.4014	0.5278	0.3197	0.5084	0.5090	1.0000	
	(.0550)	(.0492)	(.0538)	(.0478)	(.0471)		
	7.2918	10.7208	5.9398	10.6442	10.8097		
EXPERT	0.3353	0.5045	0.2351	0.5180	0.4873	0.6278	1.0000
	(.0562)	(.0479)	(.0538)	(.0463)	(.0434)	(.0423)	
	5.9642	10.5291	4.3689	11.1795	11.2228	14.8245	

SAFETY: psychological safety; MEANING: psychological meaningfulness; ROOTS: salient root needs; MOTIV: motivation to pursue the routes; CREATIV: employee creativity and entrepreneurial behaviour; OBJECTIV: accomplishing objectives; EXPERT: applying specialist expertise

Based on the basket of evidence it is therefore permissible to argue that the indicator variables used to operationalise the latent variables in the *psychological ownership* structural model accurately reflected the latent variables they were assigned to reflect. Moreover, it was concluded that the composite indicators successfully differentiated between the latent variables comprising the *psychological ownership* structural model as related, but qualitatively distinct, latent variables. The operationalisation of the latent variables comprising the structural model was considered successful as the measurement model showed close fit and the parameter estimates were statistically significant ($p<.05$) and of satisfactory magnitude. The *psychological ownership* structural model was consequently tested by fitting the comprehensive LISREL model. The results are presented and interpreted in the following section.

5.7. FITTING THE COMPREHENSIVE LISREL MODEL

The evaluation of measurement model fit, described in the previous section, concerns the success of the operationalisation of the latent variables included in the model. The evaluation of structural model fit, on the other hand, concerns the various relationships hypothesised in the model; between the exogenous and endogenous, and amongst the endogenous latent variables. The ultimate aim of this section is therefore to determine

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whether the theoretical and hypothesised relationships specified in the research are supported by the data (Diamantopoulos & Siguaw, 2000).

When fitting the *psychological ownership* structural model, although the model converged in 69 iterations and LISREL issued no warning messages, three inadmissible negative R^2 values and three inadmissible ψ_{ii} estimates exceeding unity were returned for the *routes* (*self-investment, intimate knowledge* and *control of the job*). As a result, the output for the original model could not be interpreted and the model had to be revised. Since reciprocal paths in a complex structural model generally prove to be problematic, two of these were removed. More specifically, the paths between *intimate knowledge* and *self-investment* (β_{34}) and between *job-based psychological ownership* and *self-investment* (β_{36s}) were removed. Hypothesis 12 (H_{012}: $\beta_{34} = 0$) and Hypothesis 17 (H_{017}: $\beta_{36} = 0$) could therefore not be tested. The revised comprehensive LISREL model was subsequently refitted and converged in 29 iterations with an admissible solution. The fitted comprehensive LISREL model is depicted as a path diagram in Figure 5.21.

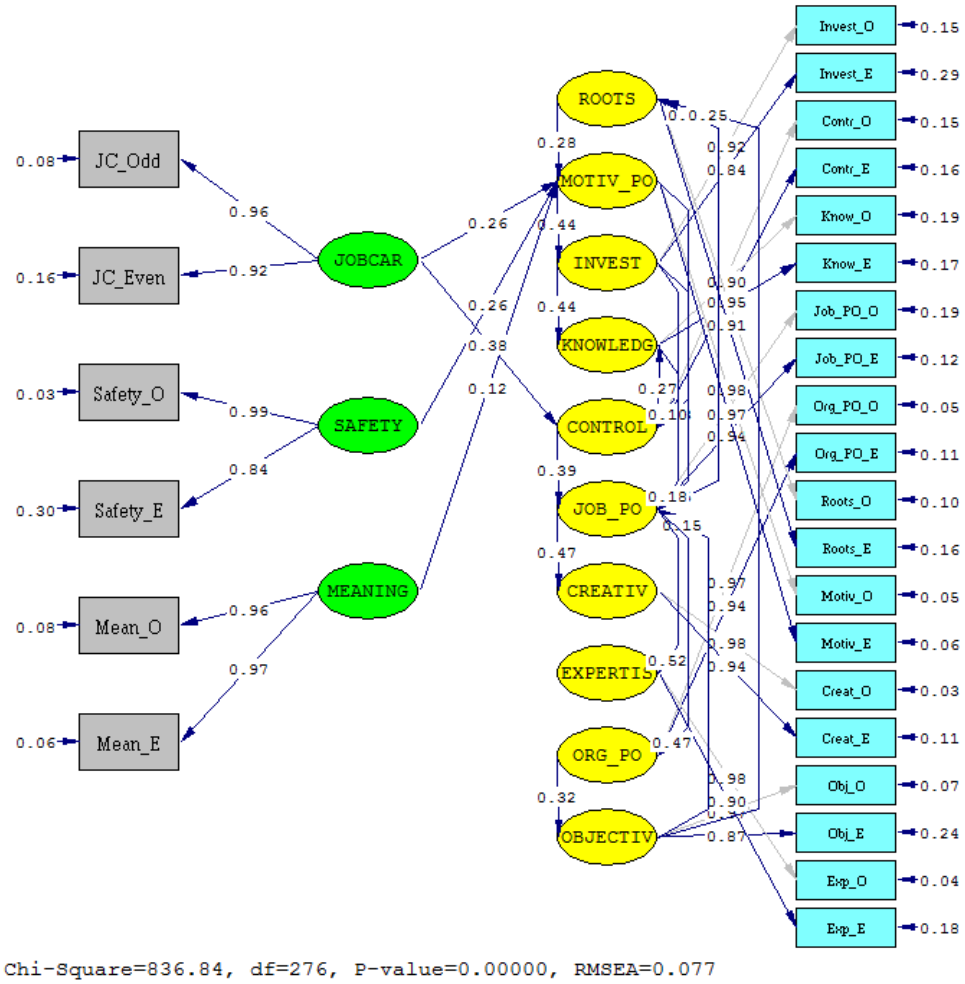

Figure 5.21. **The revised psychological ownership structural model (completely standardised solution)**

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5.7.1. Evaluating the revised psychological ownership structural model fit

The full array of model fit indices reported by LISREL are presented in Table 5.37.

Table 5.37

Goodness of Fit Statistics for the Revised Psychological Ownership Structural Model

Degrees of Freedom = 276
Minimum Fit Function Chi-Square = 985.5176 (P = 0.0)
Normal Theory Weighted Least Squares Chi-Square = 928.0030 (P = 0.0)
Satorra-Bentler Scaled Chi-Square = 836.8377 (P = 0.0)
Chi-Square Corrected for Non-Normality = 3820.8562 (P = 0.0)
Estimated Non-centrality Parameter (NCP) = 560.8377
90 Percent Confidence Interval for NCP = (477.6436 ; 651.6465)

Minimum Fit Function Value = 2.9071
Population Discrepancy Function Value (F0) = 1.6544
90 Percent Confidence Interval for F0 = (1.4090 ; 1.9223)
Root Mean Square Error of Approximation (RMSEA) = 0.07742
90 Percent Confidence Interval for RMSEA = (0.07145 ; 0.08345)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.0000

Expected Cross-Validation Index (ECVI) = 2.9110
90 Percent Confidence Interval for ECVI = (2.6656 ; 3.1789)
ECVI for Saturated Model = 2.0708
ECVI for Independence Model = 56.5901
Chi-Square for Independence Model with 325 Degrees of Freedom = 19132.0403
Independence AIC = 19184.0403
Model AIC = 986.8377
Saturated AIC = 702.0000
Independence CAIC = 19309.5929
Model CAIC = 1349.0086
Saturated CAIC = 2396.9599

Normed Fit Index (NFI) = 0.9563
Non-Normed Fit Index (NNFI) = 0.9649
Parsimony Normed Fit Index (PNFI) = 0.8121
Comparative Fit Index (CFI) = 0.9702
Incremental Fit Index (IFI) = 0.9703
Relative Fit Index (RFI) = 0.9485
Critical N (CN) = 136.1319

Root Mean Square Residual (RMR) = 0.1964
Standardized RMR = 0.1946
Goodness of Fit Index (GFI) = 0.8261
Adjusted Goodness of Fit Index (AGFI) = 0.7788
Parsimony Goodness of Fit Index (PGFI) = 0.6495

Table 5.37 reveals that the exact fit null hypothesis (H_{01a}: RMSEA=0), tested via the Satorra-Bentler scaled chi-square (χ^2= 836.8377; p<.05) had to be rejected. In other words, the model did not display exact fit in the parameter. Unfortunately, the comprehensive LISREL model also failed to display close fit in the parameter as the close fit null hypothesis (H_{01b}: RMSEA≤.05) had to be rejected (p<.05). The other goodness of fit indices returned mixed

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results. More specifically, the GFI (.826) was well below .90, which suggested less than favourable fit, while the CFI (.970) was slightly above .95, which pointed towards acceptable fit. The SRMR (.195) revealed that on average, the residuals were much larger the desired cut-off of .05. However, the RMSEA estimate was .077, which was still below the critical cut-off of .08 that suggests reasonable fit (Loehlin & Beaujean, 2017).

Moreover, the statistical power associated with testing the *psychological ownership* structural model was assessed by means of Preacher and Coffman's (2006) software in R. The analysis was conducted by specifying a RMSEA value of .05 under H_0 and an RMSEA of .08 under H_a, a significance level (α) of .05, a sample size (N) of 340, and degrees of freedom of 276. The results suggested that the probability of rejecting the close fit null hypothesis if the comprehensive model showed mediocre fit (RMSEA=.08) was quite high (1); almost a certainty. More importantly though, when adjusting the effect size assumed under H_a to .06 the statistical power associated with the test of close fit still remained quite high (.799676). Therefore, the test of close fit was a quite statistically sensitive test to the extent that even if the comprehensive LISREL model fitted quite reasonably in the parameter (RMSEA=.06), H_{01b} would with high probability have been rejected. This in turn, provided confidence regarding the position of reasonable or acceptable model fit in the parameter. Figure 5.22 shows the stem-and-leaf plot of the standardised variance-covariance residuals.

```
- 2|65331
- 1|81
- 0|8654432211000000000000000000000000000000000000000000000000
  0|111133333555566677778888999999
  1|11122233444566666666777778888999
  2|000012222333333333445555556666677777777788888888899999
  3|000001111122233344444555556666667777788899999999999
  4|00000001111233445555666778888899
  5|000011122222233345556666667777778888888999
  6|001111111222333333444455677
  7|0111233446677
  8|01347
  9|0
 10|
 11|
 12|
 13|
 14|
 15|
 16|0
```

Figure 5.22. **Stem-and-leaf plot of the standardised residuals**

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The standardised residuals were also examined as part of the evaluation of structural model fit. This entails inspection of the distribution of the residuals via the stem-and-leaf plot, as well as taking the number of small and large standardised residuals into consideration.

From Figure 5.22 it is evident that the distribution of residuals is somewhat positively skewed, rather than being dispersed symmetrically around zero. The location of the distribution was not centred around zero but rather above it, which means positive residuals dominated. The model parameters were, therefore, more inclined to underestimate the observed variance and covariance terms than to overestimate them. Table 5.38 provides a summary of the largest negative and largest positive standardised residuals.

Table 5.38

Summary Statistics for the Standardised Residuals

Summary statistics	Value
Smallest Standardized Residual	-2.5619
Median Standardized Residual	2.8662
Largest Standardized Residual	15.9850

The summary statistics for the standardised residuals of the structural model revealed that there were 196 large positive standardised residuals larger than 2.58 and no large, statistically significant (p<.05) negative standardised residuals. Stated differently, 55.84% (196/351[70]) of the standardised residuals were considered to be outliers. The fitted comprehensive LISREL model thus succeeded in accurately reproducing 155 of the 351 unique variance and covariances in the observed sample covariance matrix. The rather sizable percentage of large standardised residuals, in turn, puts the finding of reasonable or acceptable comprehensive LISREL model fit under pressure.

As part of the evaluation of comprehensive LISREL model fit, the modification indices for gamma (Γ), beta ($\mathbf{B}$) and psi (Ψ) were also examined[71]. Modification indices larger than 6.6449 indicate suggested paths or relationships that will statistically significantly (p<.01) improve the fit of the model. The percentage of statistically significant modification indices relative to the currently fixed or constrained elements were therefore calculated as a further comment on the fit of the comprehensive model. Inspection of the modification indices for Γ indicated that 13 of the 26[72] (50%) suggested paths would statistically significantly (p<.01) improve the fit of the model, if set free. The modification indices for $\mathbf{B}$ revealed that 37 of the

[70] [26 x (26 + 1)] / 2 = 351.
[71] A more elaborate discussion will take place in Chapter 6 where data driven suggestions for future research will be made based on the modification indices.
[72] (10 x 3) – 4 = 26. Where 4 represents the number of paths for gamma in the revised model.

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84[73] (44%) parameters, suggested as additional paths, would statistically significant (<.01) improve the fit of the model, if set free. Lastly, 18 of the 45[74] (35.56%) of the modification indices for Ψ were statistically significant (p<.01). The latter finding thus suggested that even after the removal of two paths, there was quite some room for improvement of the revised *psychological ownership* structural model. However, since no inadmissible values were returned when fitting the revised model and reasonable or acceptable fit was obtained, the revised *psychological ownership* structural model was not modified based on these indices. The researcher felt quite strongly that for the purpose of the current study, the modification indices should be used to derive data-driven hypotheses for future research, and should not be used to empirically iterate the originally hypothesised model to obtain better fit.

In coming to a decision on whether the interpretation of the structural model parameter estimates was warranted, the current study emphasised the fit statistics and the power analysis results more strongly than the analysis of the standardised variance-covariance residuals and the modification indices. Although it is acknowledged that the evidence obtained on model fit is not unanimous, the current study would argue that the foregoing evidence regarding comprehensive LISREL model fit justified the interpretation of various structural model parameter estimates reported by the Γ, B and Ψ matrices, as well as the R^2 of the endogenous latent variables.

5.7.2. Examining the structural model parameter estimates

Four aspects were considered when examining and interpreting the structural model parameter estimates. Firstly, the sign (positive/negative) of the estimated path coefficient had to correspond with the manner in which the relationship was hypothesised. The sign of all the structural error variance estimates, however, had to be positive. Secondly, the statistical significance[75] (p<.05) of the unstandardised estimated path coefficients was examined to determine whether the estimates could be generalised to the parameter. Thirdly, the magnitude of the completely standardised parameter estimates was examined in order to establish the strength of the hypothesised relationship. Lastly, the squared multiple correlations of the endogenous variables were examined to determine the proportion of variance accounted for by the latent variables that were hypothesised to influence them (Diamantopoulos & Siguaw, 2000).

[73] (10 x 10) – 16 = 84. Where 16 represents the number of paths for beta in the revised model.
[74] (10 x 9) / 2 = 45.
[75] Again, a critical value of 1.6449 was used to evaluate the statistical significance of the parameter estimates because the alternative hypotheses were all formulated as directional hypotheses.

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In order to establish whether the hypothesised path-specific relationships were supported by the data, the unstandardised Γ and $\mathbf{B}$ regression coefficient matrices were interpreted. The unstandardised gamma matrix shows the regression slope coefficients or γ_{ij} parameter estimates, standard error and the z-value for the relationship between the exogenous (ξ) and endogenous (η) latent variables. The unstandardised beta matrix shows the regression/path coefficients or β_{ij} parameter estimates, standard errors and z-value for the relationship between the endogenous (η) latent variables. Furthermore, the estimates in both matrices were interpreted as partial regression coefficients[76] (Diamantopoulos & Siguaw, 2000). The unstandardised gamma matrix is shown in Table 5.39, while the unstandardised beta matrix is shown in Table 5.40.

Table 5.39

Unstandardised Gamma Matrix

	JC	SAFETY	MEANING
MOTIV	0.2602*	0.2576*	0.1191*
	(.0606)	(.0597)	(.0619)
	4.2926	4.3145	1.9226
CONTROL	0.3801*	- -	- -
	(.0646)		
	5.8872		
JOB_PO	- -	- -	- -
CREATIVE	- -	- -	- -
EXPERTIS	- -	- -	- -
ORG_PO	- -	- -	- -
OBJECTIV	- -	- -	- -

* (p<.05)

JC: job characteristics; SAFETY: psychological safety; MEANING: psychological meaningfulness; MOTIV: motivation to pursue the routes; CONTROL: control of the job route; JOB_PO: job-based psychological ownership; CREATIV: employee creativity and entrepreneurial behaviour; EXPERTIS: applying specialist expertise; ORG_PO: organisation-based psychological ownership; OBJECTIV: accomplishing objectives

[76] This means that γ_{ij} and β_{ij} describe the average change in η_j associated with one unit change in ξ_i or η_i when controlling for or holding all other latent variables that were structurally linked to η_j constant (Lee, 2017).

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Table 5.40

Unstandardised Beta Matrix

	ROOTS	MOTIV	INVEST	KNOW	CONTROL	JOB_PO	CREATIV	EXPERTIS	ORG_PO	OBJECTIV
ROOTS	- -	- -	- -	- -	- -	**0.0983** (.0774) **1.2702**	- -	- -	- -	0.2456* (.0554) 4.4347
MOTIV	0.2760* (.0597) 4.6237	- -	- -	- -	- -	- -	- -	- -	- -	- -
INVEST	- -	0.4358* (.0580) 7.5199	- -	- -	- -	- -	- -	- -	- -	- -
KNOW	- -	- -	0.4431* (.0633) 6.9962	- -	0.2714* (.0581) 4.6712	- -	- -	- -	- -	- -
CONTROL	- -	0.2322* (.0725) 3.2023	0.0971* (.0661) 1.4674	- -	- -	- -	- -	- -	- -	- -
JOB_PO	- -	- -	0.3458* (.0554) 6.2422	0.1824* (.0593) 3.0792	0.3923* (0.0534) 7.3491	- -	- -	- -	- -	0.1512* (.0425) 3.5555
CREATIV	- -	- -	- -	- -	- -	0.4722* (.0670) 7.0500	- -	- -	- -	- -
EXPERTIS	- -	- -	- -	- -	- -	0.5227* (.0614) 8.5112	- -	- -	- -	- -
ORG_PO	- -	- -	- -	- -	- -	0.4661* (.0573) 8.1298	- -	- -	- -	- -
OBJECTIV	- -	- -	- -	- -	- -	- -	- -	- -	0.3187* (.0588) 5.4174	- -

* (p<.05)

ROOTS: salient root needs; MOTIV: motivation to pursue the routes; INVEST: self-investment route; KNOW: intimate knowledge route; CONTROL: control of the job route; JOB_PO: job-based psychological ownership; CREATIV: employee creativity and entrepreneurial behaviour; EXPERTIS: applying specialist expertise; ORG_PO: organisation-based psychological ownership; OBJECTIV: accomplishing objectives

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The signs of all the γ and β parameter estimates were consistent with the nature of the hypothesised relationship between the latent variables. By inspecting the statistical significance of the γ and β parameter estimates, it could be determined whether the path-specific coefficient hypotheses had to be rejected or not. The unstandardised gamma matrix (Table 5.39) indicated that all four of the freed γ_{ij} path coefficient estimates for γ were statistically significant ($p<.05$). This means that the following null hypotheses were rejected and the corresponding path-specific substantive hypotheses therefore corroborated[77]:

In the proposed *psychological ownership* structural model it was hypothesised that:

Hypothesis 3 (H_{03}: $\gamma_{21} = 0$)[78]: *job characteristics* positively influence *motivation to pursue the routes to psychological ownership*.

Hypothesis 4 (H_{04}: $\gamma_{51} = 0$): *job characteristics* positively influence *control of the job*.

Hypothesis 5 (H_{05}: $\gamma_{23} = 0$): the extent to which an employee experiences *psychological meaningfulness* will positively influence *motivation to pursue the routes to psychological ownership*.

Hypothesis 6 (H_{06}: $\gamma_{22} = 0$): the extent to which an employee experiences *psychological safety* will positively influence *motivation to pursue the routes to psychological ownership*.

The unstandardised beta matrix (Table 5.40) revealed that 15 of the 16 β_{ij} path coefficients were statistically significant ($p<.05$). The regression slope estimate β_{16} was statistically insignificant ($p>.05$), which meant that H_{016} could not be rejected. In other words, support was not found for Hypothesis 16, which stated that *job-based psychological ownership* positively influences an employee's *salient root needs* (when statistically controlling for the other latent variables linked in the structural model to *salient root needs*). However, all the remaining β_{ij} path coefficient estimates were statistically significant ($p<.05$). This means that the following null hypotheses were rejected and the corresponding path-specific substantive hypotheses therefore corroborated: In the proposed *psychological ownership* structural model it was hypothesised that:

Hypothesis 2 (H_{02}: $\beta_{21} = 0$): *salient root needs* positively influence *motivation to pursue the routes to psychological ownership*.

---

[77] Each path-specific substantive hypothesis, where η_i is influenced by more than one latent variable in the hypothesised structural model, should be interpreted along with the phrase 'when statistically controlling for the other latent variables linked in the structural model to η_j.'

[78] It is thereby not implied that the null hypothesis constitutes the statistical equivalent of the path-specific substantive hypothesis. Since the path-specific substantive hypothesis was tested by testing the null hypothesis, the latter was provided in brackets next to the path-specific substantive hypothesis.

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Hypothesis 7 (H_{07}: $\beta_{32} = 0$): *motivation to pursue the routes* positively influences the extent to which an employee *invests* himself or herself into the job.

Hypothesis 8 (H_{08}: $\beta_{52} = 0$): *motivation to pursue the routes* positively influences *control of the job.*

Hypothesis 9 (H_{09}: $\beta_{53} = 0$): *self-investment* positively influences *control of the job.*

Hypothesis 10 (H_{010}: $\beta_{45} = 0$): the degree of *control of the job* positively influences the extent to which an employee gains *intimate knowledge* of the job.

Hypothesis 11 (H_{011}: $\beta_{43} = 0$): *self-investment* positively influences the extent to which an employee gains *intimate knowledge* of the job.

Hypothesis 13 (H_{013}: $\beta_{63} = 0$): *self-investment* has a positive influence on *job-based psychological ownership.*

Hypothesis 14 (H_{014}: $\beta_{64} = 0$): the extent to which *intimate knowledge* of the job is gained has a positive influence on *job-based psychological ownership*.

Hypothesis 15 (H_{015}: $\beta_{65} = 0$): *control of the job* has a positive influence on *job-based psychological ownership.*

Hypothesis 18 (H_{018}: $\beta_{76} = 0$): *job-based psychological ownership* positively influences *employee creativity and entrepreneurial behaviour.*

Hypothesis 19 (H_{019}: $\beta_{96} = 0$): *job-based psychological ownership* positively influences *organisation-based psychological ownership.*

Hypothesis 20 (H_{020}: $\beta_{10,9} = 0$): *organisation-based psychological ownership* positively influences an employee to *accomplish objectives*.

Hypothesis 22 (H_{022}: $\beta_{1,10} = 0$): *accomplishing objectives* positively influences an employee's *salient root needs.*

Hypothesis 23 (H_{023}: $\beta_{6,10} = 0$): *accomplishing objectives* positively influences *job-based psychological ownership.*

Hypothesis 24 (H_{024}: $\beta_{86} = 0$): *job-based psychological ownership* positively influences an employee's motivation to *apply specialist expertise*.

Besides Hypothesis 12 (H_{012}: $\beta_{34} = 0$) and Hypothesis 17 (H_{017}: $\beta_{36} = 0$), which could not be tested in the revised *psychological ownership* model, and Hypothesis 16 (H_{016}: $\beta_{16} = 0$),

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which was not corroborated, all of the estimated γ_{ij} and β_{ij} path coefficients were statistically significant ($p<.05$).

The mediation hypothesis that *organisation-based psychological ownership* (ORG_PO) mediates the effect of *job-based psychological ownership* (JOB_PO) on *accomplishing objectives* (OBJECTIV) was tested by translating the SIMPLIS syntax file that fitted the reduced comprehensive LISREL model to LISREL syntax. Using the AP=1 and CO commands, an additional parameter was calculated by taking the product of β_{96} and $\beta_{10,9}$ and testing its statistical significance. The results indicated that the indirect effect of *job-based psychological ownership* on *accomplishing objectives*, mediated by *organisation-based psychological ownership,* was statistically significant (z-value=4.91; $p<.05$). In other words, support was also obtained for Hypothesis 21 (H_{021}: $\beta_{96}\,\beta_{10,9} = 0$), which postulated that *organisation-based psychological ownership* mediates the relationship between *job-based psychological ownership* and *accomplishing objectives*.

It should be reiterated that the support for these 20 hypotheses, and the lack of support for one hypothesised effect, is grounded on the fact that each hypothesis claims that a specific exogenous or endogenous latent variable influences a specific endogenous latent variable, when all other latent variables that are structurally linked to it, are controlled or held constant. The phrase 'in the proposed psychological ownership structural model it is hypothesised that' also purposefully acknowledges the latter. Where support was found for those path-specific substantive hypotheses in which η_j was influenced by more than one latent variable, the findings meant that the unique variance in the hypothesised effect, not explained by the other η_i or ξ_i linked to η_j, significantly explained unique variance in η_j, that was not explained by the other η_i or ξ_i linked to it in the structural model. The lack of support that was found for path-specific substantive Hypothesis 16, meant that the unique variance in *job-based psychological ownership,* not explained by *accomplishing objectives,* did not statistically significantly explain unique variance in employee's *salient root needs,* that was also not explained by *accomplishing objectives*.

In order to evaluate the strength of the statistically significant ($p<.05$) direct effects or the magnitude of the regression slope of the statistically significant ($p<.05$) relationships in the structural model, the completely standardised gamma (Table 5.41) and beta (Table 5.42) regression coefficient matrices were interpreted. These matrices express the average change in the focal endogenous (η_j) latent variable, expressed in standard deviation units, associated with one standard deviation change in either the endogenous (η_i) or exogenous (ξ_i) latent variable (when controlling for the other effects linked to η_j in the structural model).

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Table 5.41

Completely Standardised Gamma Matrix

	JC	SAFETY	MEANING
MOTIV	.2602	.2576	.1191
CONTROL	.3801	- -	- -
JOB_PO	- -	- -	- -
CREATIVE	- -	- -	- -
EXPERTIS	- -	- -	- -
ORG_PO	- -	- -	- -
OBJECTIV	- -	- -	- -

JC: job characteristics; SAFETY: psychological safety; MEANING: psychological meaningfulness; MOTIV: motivation to pursue the routes; CONTROL: control of the job route; JOB_PO: job-based psychological ownership; CREATIV: employee creativity and entrepreneurial behaviour; EXPERTIS: applying specialist expertise; ORG_PO: organisation-based psychological ownership; OBJECTIV: accomplishing objectives

Table 5.42

Completely Standardised Beta Matrix

	ROOTS	MOTIV	INVEST	KNOW	CONTROL	JOB_PO	CREATIV	EXPERTIS	ORG_PO	OBJECTIV
ROOTS	- -	- -	- -	- -	- -	.0983	- -	- -	- -	.2456
MOTIV	.2760	- -	- -	- -	- -	- -	- -	- -	- -	- -
INVEST	- -	.4358	- -	- -	- -	- -	- -	- -	- -	- -
KNOW	- -	- -	.4431	- -	.2714	- -	- -	- -	- -	- -
CONTROL	- -	.2322	.0971	- -	- -	- -	- -	- -	- -	
JOB_PO	- -	- -	.3458	.1824	.3923	- -	- -	- -	- -	.1512
CREATIV	- -	- -	- -	- -	- -	.4722	- -	- -	- -	- -
EXPERTIS	- -	- -	- -	- -	- -	.5227	- -	- -	- -	- -
ORG_PO	- -	- -	- -	- -	- -	.4661	- -	- -	- -	- -
OBJECTIV	- -	- -	- -	- -	- -	- -	- -	- -	.3187	- -

ROOTS: salient root needs; MOTIV: motivation to pursue the routes; INVEST: self-investment route; KNOW: intimate knowledge route; CONTROL: control of the job route; JOB_PO: job-based psychological ownership; CREATIV: employee creativity and entrepreneurial behaviour; EXPERTIS: applying specialist expertise; ORG_PO: organisation-based psychological ownership; OBJECTIV: accomplishing objectives

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From Table 5.41 and Table 5.42 it appears that *job-based psychological ownership* had the most pronounced effect on *applying specialist expertise* (.523). This was followed by its influence on *employee creativity and entrepreneurial behaviour* (.472) and *organisation-based psychological ownership* (.466). The influence of *self-investment* on *intimate knowledge* (.443), as well as the influence of *motivation to pursue* the routes on *self-investment* (.436) were both moderately strong. The effect of *control* and *self-investment* on *job-based psychological ownership* (.392 and .346, respectively) were moderate. The influence of *job characteristics* on *control* (.380), as well as the influence of *organisation-based psychological ownership* on *accomplishing objectives* (.319) were also less pronounced. The indirect effect of *job-based psychological ownership* on *accomplishing objectives* mediated by *organisation-based psychological ownership* was rather small (.15). This could be attributed to the fact that the mediation effect is the product of two other paths (β_{96} and $\beta_{10,9}$). Nevertheless, overall most of the paths were of satisfactory magnitude.

Table 5.43 shows the R^2 for the structural equations that indicate the proportion of variance that the model explains in each of the 10 endogenous (η) latent variables. In other words, the R^2 values provide an indication of the "amount of variance in each endogenous latent variable that was accounted for by the latent variables that are structurally linked to it in the model" (Lee, 2017, p. 128).

Table 5.43

Squared Multiple Correlations for the Endogenous Latent Variables

ROOTS	MOTIV	INVEST	KNOW	CONTROL
.1063	.3629	.2025	.3392	.3239
JOB_PO	**CREATIV**	**EXPERTIS**	**ORG_PO**	**OBJECTIV**
.5862	.2230	.2732	.2566	.1467

ROOTS: salient root needs; MOTIV: motivation to pursue the routes; INVEST: self-investment route; KNOW: intimate knowledge route; CONTROL: control of the job route; JOB_PO: job-based psychological ownership; CREATIV: employee creativity and entrepreneurial behaviour; EXPERTIS: applying specialist expertise; ORG_PO: organisation-based psychological ownership; OBJECTIV: accomplishing objectives

Table 5.43 indicates that the model explains a rather gratifying 59% of the variance in the focal latent variable, namely *job-based psychological ownership*. The revised psychological ownership structural model also provides a satisfactory explanation (more than 30%) of the variance in *motivation to pursue*, *intimate knowledge* and *control of the job*. However, the model provided a somewhat less satisfactory explanation of the variance in *applying specialist expertise* (27%), *organisation-based psychological ownership* (26%), *creativity and entrepreneurial behaviour* (22%) and *self-investment* (20%). The rather small R^2 values are not concerning as one could not expect a second-generation explanatory structural

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model to provide a perfect explanation of the variance in the latent variables; especially those that lie more down-stream in the process. The R^2 values are also indicative of areas in the model that require elaboration or extension.

Lastly, the psi matrix was examined in order to evaluate the statistical significance ($p<.05$) of the structural error variances and the magnitude of the variance in η_j that is not explained by the model, but rather by unknown latent effects currently unacknowledged by the model. Since the unstandardised and completely standardised versions of matrices that comprise of only latent variables (i.e., $\mathbf{B}$, Γ and Ψ) are the same, only the unstandardised psi matrix (Table 5.44) is presented in order to eliminate the need to report on two matrices that provide similar information.

Table 5.44

Unstandardised and Completely Standardised Psi Matrix

ROOTS	MOTIV	INVEST	KNOW	CONTROL
.8937*	.6371*	.7975*	.6608*	.6761*
(.0992)	(.0592)	(.0877)	(.0791)	(.0719)
9.0114	10.7576	9.0949	8.3521	9.4100
JOB_PO	**CREATIV**	**EXPERTIS**	**ORG_PO**	**OBJECTIV**
.4138*	.7770*	.7268*	.7434*	.8533*
(.0513)	(.0818)	(.0731)	(.0713)	(.0930)
8.0704	9.4962	9.9467	10.4273	9.1727

* ($p<.05$)

ROOTS: salient root needs; MOTIV: motivation to pursue the routes; INVEST: self-investment route; KNOW: intimate knowledge route; CONTROL: control of the job route; JOB_PO: job-based psychological ownership; CREATIV: employee creativity and entrepreneurial behaviour; EXPERTIS: applying specialist expertise; ORG_PO: organisation-based psychological ownership; OBJECTIV: accomplishing objectives

It is evident that all ten of the structural error variance estimates were statistically significant ($p<.05$). This means that the 10 null hypotheses that claim that the structural error variance associated with each endogenous latent variable equals zero in the parameter, had to be rejected. For example, about 41% of the variance in *job-based psychological ownership* is not explained by the revised *psychological ownership* structural model. The finding of small, but significant error variances, however, is expected as the model cannot be regarded as perfect or complete. The ψ_{ii} values shown in Table 5.44 echo the suggestions derived from Table 5.43 regarding the areas in the model that require elaboration or extension.

5.8. SUMMARY OF THE RESEARCH RESULTS

The purpose of this chapter was to report and examine the research results from the statistical analyses performed in order to determine whether the proposed *psychological*

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ownership structural model provides a valid account of the psychological mechanism underpinning levels of *psychological ownership* experienced by employees.

This entailed a detailed evaluation of the psychometric properties of the measurement instruments via item analysis and dimensionality analysis. The measurement model obtained close fit, which indicated successful operationalisation of the latent variables. However, the proposed *psychological ownership* structural model had to be revised as the model converged with three inadmissible values. Fortunately, the revised *psychological ownership* structural model obtained reasonable fit. Chapter 6 will provide some concluding remarks based on the findings and outline the practical implications, limitations of the study and offer recommendations for future research.

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CHAPTER 6

IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

6.1. INTRODUCTION

The current study has elaborated on the first-generation explanatory *psychological ownership* structural model presented by Lee (2017). The reason therefore being to contribute to a more penetrating understanding of the manner in which *psychological ownership* is embedded in a larger complex nomological network of latent variables and to determine how it structurally relates to performance. An introductory argument motivating the importance of cumulative research regarding *psychological ownership*, along with the research-initiating question and research objectives were presented in Chapter 1. In response to the overarching and more specific research-initiating questions, an overarching substantive research hypothesis, 23 path-specific substantive research hypotheses and a second-generation explanatory *psychological ownership* structural model were proposed in Chapter 2. The research methodology used to evaluate the validity of the proposed research hypotheses and *psychological ownership* structural model was then outlined in Chapter 3. More specifically, an *ex post facto* correlation design, with SEM as the analysis technique was used. Chapter 4 described several ethical aspects, standards and risks that were considered prior to conducting the research. The results obtained from the statistical analyses were then presented and examined in Chapter 5. This chapter describes the research results (theoretical implications), managerial implications, limitations of the study and offers recommendations for future research from a data and theoretical perspective.

6.2. DISCUSSION

The assumption that *psychological ownership* is complexly determined implies that it is only through cumulative research that the discipline can aspire to achieve a reasonable approximation of the psychological mechanism regulating the levels of *job-based psychological ownership* experienced by employees. Cumulative research studies are first and foremost aimed at extending the existing explanatory structural model. Cumulative research studies, however, also serve a corroborative function with regards to the paths that coincide in the earlier, more restricted models, and later, more expansive structural models. It is therefore an imperative that due consideration be given to how the results obtained by Lee (2017) correspond with the current study's findings. Confidence in the (positive and

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negative) findings reported by Lee (2017) will be significantly enhanced if the current study could corroborate these findings. An important caveat, however, is in order.

Even though specific hypothesised paths in the proposed *psychological ownership* structural model of both studies appear to be the same (e.g. both studies hypothesised that *salient root needs* positively influence the *motivation to pursue the routes*), strictly speaking, the findings need not necessarily be directly comparable. The path coefficients were all treated as partial regression coefficients in that the effect of ξ_j on η_i (γ_{ij}) or the effect of η_j on η_i (β_{ij}) were described when controlling for the other effects in the model linked to η_i. Therefore, although certain paths do correspond between the two studies, a particular endogenous latent variable in the current study can be influenced by different exogenous and/or endogenous latent variables in the structural model than in Lee's (2017) study. In other words, the variance that was controlled for when investigating a particular path coefficient in the current study, may have differed from the variance that was controlled for in Lee's (2017) study. Nevertheless, the findings that do correspond will be outlined.

The overarching research-initiating question of the current study posed the question: Why is there variance in *psychological ownership*, when statistically controlling for the latent variables included in the reduced Lee (2017) explanatory *psychological ownership* structural model? The research-initiating question of the current research study was therefore: What other latent variables and critical psychological conditions, besides those identified by Lee (2017), create variance in *psychological ownership*? More specifically, the current study also focused on the question concerning the potential reciprocal relationship between performance outcomes and *psychological ownership* that enquired: How do performance outcomes create variance in the psychological state of *psychological ownership*? The primary objective of this research study was therefore to modify, elaborate and empirically evaluate the *psychological ownership* structural model developed by Lee (2017), by:

- Critically examining the latent variables and paths currently included in the Lee (2017) *psychological ownership* structural model;
- Identifying additional latent variables directly and/or indirectly creating variance in *psychological ownership;*
- Specifically identifying causally down-stream consequences of *psychological ownership* (or the lack thereof) that may directly and/or indirectly feed back onto *psychological ownership*;

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- Depicting the potential reciprocal relationship between *job-based psychological ownership* and performance outcomes, in order to demonstrate how they structurally relate;
- Empirically testing the second-generation *psychological ownership* structural model.

6.2.1. Research results and theoretical implications

The psychometric evaluation of the 11 measurement instruments via item analysis and dimensionality analysis revealed results that were compatible with the position that all of the scales provided an adequate measure of the specific variables they were designed to assess (i.e., the scales obtained acceptable evidence of reliability and validity). However, factor fission was obtained on the *control* and *belonging* subscales. The latent *control* dimension of the *routes to psychological ownership* construct and the latent *belonging* dimension of the *salient root needs* construct were both initially conceptualised as unidimensional latent dimensions of these two multidimensional constructs. In the case of both the *control* and *belonging* subscales, two factors had to be extracted to obtain credible and valid explanations of the two subscales' inter-item correlation matrices. In the case of the *control* first-order measurement model, reflecting the loading pattern described in the pattern matrix, fitted poorly. The theta-delta covariance modification indices indicated that a bifactor model would be better able to account for the *control* subscale inter-item correlation matrices. The *control* bifactor model, which was fitted using DWLS estimation, showed exact fit. The R^2 values ranged from .688 to .784, which meant that a large part of the variance in the items were explained by the two factors linked to them, albeit more so by the general factor. In the case of the *belonging* first-order measurement model, reflecting the loading pattern described in the pattern matrix, fitted closely. Due to a small number of items in the subscale, the second-order *belonging* measurement model was not identified and could not be fitted. The statistical significance of the indirect effect of the second-order *belonging* factor on the subscale items could therefore not be evaluated.

With the exception of the *belonging* subscale items (where insufficient evidence existed to come to such a conclusion), all the items were considered successful indicators of the latent variable they were earmarked to reflect. Only one item, namely Belong4, was removed from the *salient root needs* scale and therefore excluded from the item parcel calculation.

The *psychological ownership* measurement model obtained close fit in the parameter (RMSEA=.029; p>.05), the parameter estimates were statistically significant (p<.05) and of satisfactory magnitude. The operationalisation of the latent variables comprising the structural model was therefore considered successful. When fitting the proposed

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psychological ownership structural model, however, the model converged with three inadmissible negative R^2 values and three inadmissible ψ_{ii} estimates exceeding unity for the three *routes to psychological ownership* (*self-investment, intimate knowledge* and *control of the job*). Consequently, the original model was revised by removing two feedback or reciprocal paths. More specifically, the paths between *intimate knowledge* and *self-investment* (β_{34}), and between *job-based psychological ownership* and *self-investment* (β_{36}) were removed. Hypothesis 12 (H_{012}: $\beta_{34} = 0$) and Hypothesis 17 (H_{017}: $\beta_{36} = 0$) were therefore not tested. The revised comprehensive LISREL model was subsequently refitted and converged with an admissible solution.

Both the exact fit (H_{01a}: RMSEA=0) and close fit (H_{01b}: RMSEA$\leq$.05) null hypotheses had to be rejected ($p<.05$) for the revised *psychological ownership* structural model. In other words, the model did not display exact or close fit in the parameter. However, it was argued that the model obtained reasonable or acceptable fit, based on the RMSEA estimate of .077, other fit statistics (e.g. CFI=.970) and the power analysis results. It was acknowledged that although the evidence obtained on model fit was not unanimous, the evidence regarding comprehensive LISREL model fit justified the interpretation of various structural model parameter estimates (reported by the Γ, $\mathbf{B}$ and Ψ matrices) and the R^2 values of the endogenous latent variables.

The signs of all the γ and β parameter estimates were consistent with the nature of the hypothesised relationship between the latent variables. Out of the 23 path-specific null hypotheses proposed in Chapter 2, only Hypothesis 16 (H_{016}: $\beta_{16} = 0$) was not corroborated, while Hypothesis 12 (H_{012}: $\beta_{34} = 0$) and Hypothesis 17 (H_{017}: $\beta_{36} = 0$) could not be evaluated and therefore remain untested. In other words, all of the estimated γ_{ij} and β_{ij} path coefficients were statistically significant ($p<.05$) except for β_{16} (and the untested β_{34} and β_{36}). Figure 6.1 provides a visual representation of the relationships in the proposed *psychological ownership* model that were supported by the data, those that were not supported by the data and those that could not be investigated.

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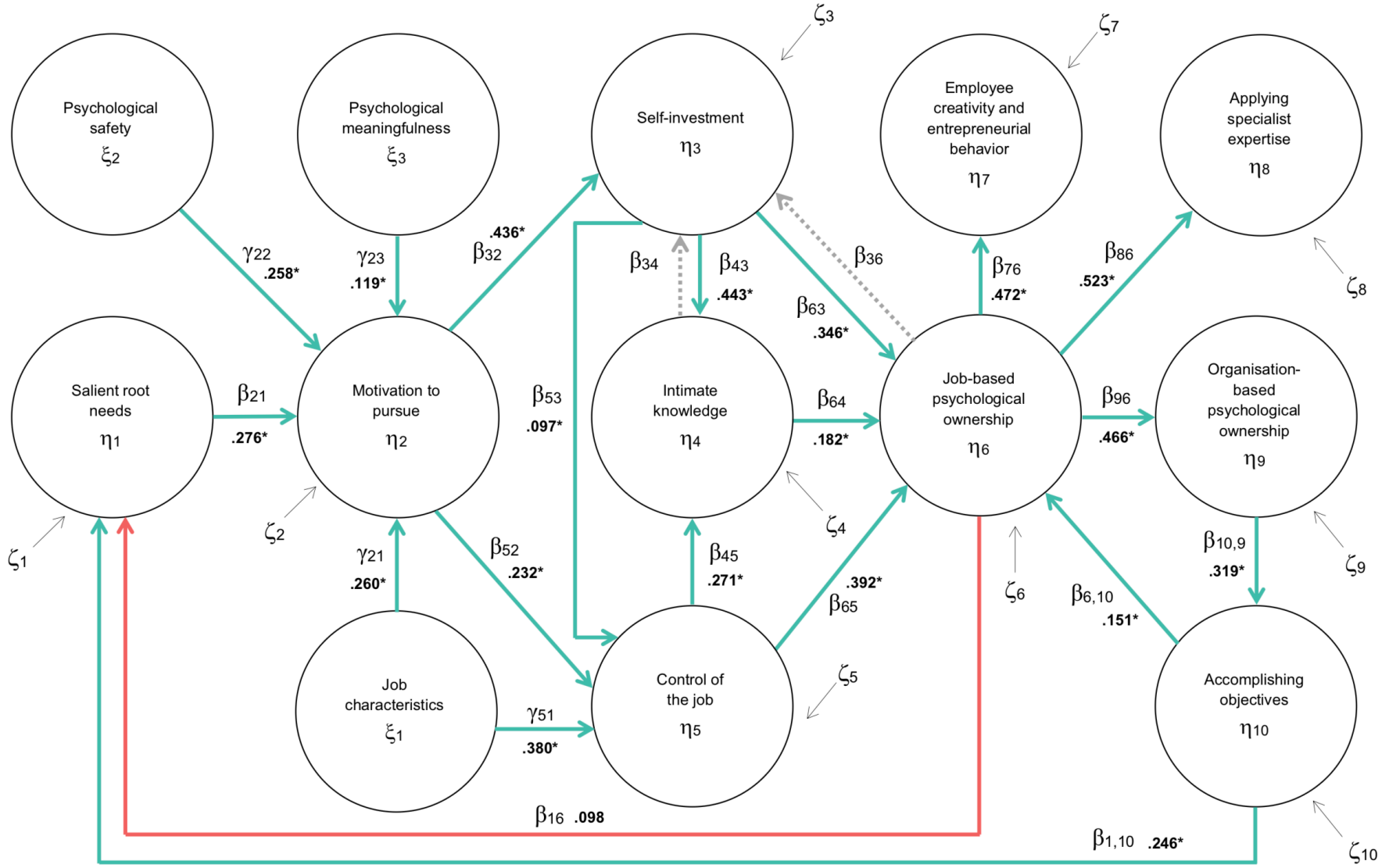

Figure 6.1. **Final psychological ownership structural model**

Supported path; * (p<.05)

Path not supported

Path removed and not tested

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As shown in Figure 6.1, the following null hypotheses were rejected and the corresponding path-specific substantive hypotheses therefore corroborated: H_{02} (β_{21}), H_{03} (γ_{21}), H_{04} (γ_{51}), H_{05} (γ_{23}), H_{06} (γ_{22}), H_{07} (β_{32}), H_{08} (β_{52}), H_{09} (β_{53}), H_{010} (β_{45}), H_{011} (β_{43}), H_{013} (β_{63}), H_{014} (β_{64}), H_{015} (β_{65}), H_{018} (β_{76}), H_{019} (β_{96}), H_{020} ($\beta_{10,9}$), H_{022} ($\beta_{1,10}$), H_{023} ($\beta_{6,10}$), H_{024} (β_{86}) and the indirect effect, H_{021} (β_{96} $\beta_{10,9}$). Moreover, for most of the paths, the strength of all the statistically significant ($p<.05$) direct effects were of satisfactory magnitude.

It should be acknowledged, however, that the rejection of the path-specific null hypotheses were not interpreted to mean that the causal claims made by the path-specific substantive hypotheses have been unambiguously corroborated. The path-specific hypotheses have received support in the sense that they have survived an opportunity to be falsified. Moreover, it is acknowledged that a finding of reasonable or acceptable model fit and significant path coefficients does not mean that the levels of the focal endogenous latent variable *job-based psychological ownership* are necessarily caused by the mechanism portrayed in the fitted structural model, but rather that the model provides one plausible explanation of the process that regulates the levels of *psychological ownership* experienced by employees. Nevertheless, the empirical findings provide support the following relationships[79]:

The *motivation to pursue the routes to psychological ownership* is positively influenced by the *salient root needs, job characteristics*, *psychological safety* and *psychological meaningfulness.* Based on Lee's (2017) theorising, it was argued that the *motivation to pursue the routes to psychological ownership* is the core psychological mechanism through which *psychological ownership* develops. The construct was based on Vroom's (1964) expectancy theory that involves the concepts of valence, expectancy and instrumentality. Firstly, it is evident that due to the *salience* (strength and importance) of the roots or human needs (intra-individual forces), and through their desired satisfaction, they motivate behaviour. Secondly, the *job characteristics* affect the perceived ability of the job to satisfy the root needs via the *routes*. The drive to engage in the *routes*, is thus a function of the extent to which the root needs are experienced as *salient* and the degree to which the target (i.e., the job) is perceived to be able to satisfy these root needs (Brown *et al,.* 2014). Thirdly, employees who experience the psychological states of *psychological safety* and

[79] As mentioned, where η_i was influenced by more than one latent variable in the hypothesised structural model, the variance explained by other variables linked to η_i was controlled for. Support for these relationships therefore means that each exogenous or endogenous latent variable explains *unique variance* in the particular endogenous (η_j) latent variable that is not explained by the other latent variables linked to η_j.

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psychological meaningfulness will be *motivated to pursue the routes to psychological ownership*[80].

The empirical evidence indicated that *motivation to pursue the routes* positively influences the extent to which an employee *invests* him-/herself into the job and the extent to which an employee takes *control of the job*. In other words, through the activation and desired satisfaction of the underlying motives (Pierce & Jussila, 2011) or *salient root needs*, an employee is *motivated to pursue the routes* by *investing the self* into the job (Lee, 2017) and taking *control* of it. Support was also obtained for the positive influence of *self-investment* on taking *control of the job*, which means that *investing the self* into the job is thus a prerequisite that allows the individual to take *control of the job.* However, support was also obtained for the positive influence of *job characteristics* on the extent to which an employee takes *control of the job*. This means that the job design is a crucial aspect in the process as it either facilitates or hinders the ability or opportunity to take *control of the job* (Hackman & Oldham, 1980).

The empirical evidence supported the argument that the extent to which an employee gains *intimate knowledge* of their job is positively influenced by their *control of the job* and *self-investment* into the job. In other words, by taking control of the target (job) and investing oneself into the target (job), an employee thereby gains even deeper knowledge and insight about the target, and one resultantly becomes even more "deeply engrained into the target" (Lee, 2017, p. 75). Unfortunately, it could not be determined whether the more *intimate knowledge* an employee gains regarding the job, the more he/she will *invest the self* into the job in order to protect, maintain and enhance the target of ownership (job). The reciprocal relationship between *self-investment* and *intimate knowledge* was therefore not tested. Although it makes theoretical sense, Lee (2017) was also forced to remove this path due to an inadmissible value[81].

The empirical evidence indicated that the *routes to psychological ownership*, namely *self-investment, intimate knowledge* and *control of the job* positively influence *job-based psychological ownership*. This confirms the argument by Pierce *et al.* (2001, 2003) and Brown *et al*. (2014, p. 328) that the three *routes to psychological ownership* are the "paths" down which people travel or the actions that people engage in (and resultant experiences)

[80] Kahn (1990) argued that *psychological safety* and *psychological meaningfulness* would directly trigger what he termed *personal engagement*. Personal engagement corresponds to the *self-investment* latent variable included in Pierce and Jussila (2011), Lee (2017) and the current research study. However, contrary to Kahn (1990), Lee (2017) and the current study argued that the effect of *psychological safety* and *psychological meaningfulness* on *self-investment* is mediated by the *motivation to pursue the routes to psychological ownership*.

[81] The current study acknowledges that these type of feedback effects would be more appropriately investigated via longitudinal structural models (Little, 2013).

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with regards to a target that give rise to feelings of ownership. Unfortunately, it was not determined whether *job-based psychological ownership* negatively influences a person's willingness to *invest the self* into the job once levels of ownership towards the job exists. The reciprocal relationship between *job-based psychological ownership* and *self-investment* was therefore not tested.

In terms of the outcomes of *psychological ownership*, support was obtained for the positive influence of *job-based psychological ownership* on *employee creativity and entrepreneurial behaviour.* This means that employees with feelings of ownership, will be more likely to generate creative ideas (Cohen-Meitar *et al.,* 2009), explore and exploit entrepreneurial opportunities, and develop strategies, while exhibiting principal-like behaviour or taking responsibility for their actions (Sieger *et al.,* 2013).

The empirical evidence supported the argument that *job-based psychological ownership* positively influences *organisation-based psychological ownership*, while *organisation-based psychological ownership* positively influences *accomplishing objectives*[82]*.* This confirmed Pierce and Peng's (2015) findings that feelings of ownership towards the job transfer to feelings of ownership towards the organisation. Therefore, since the resultant sense of responsibility and accountability (Avey *et al.,* 2009) towards the job, should also be felt towards the organisation in which the job is embedded, employees with *job-based psychological ownership* will be willing to *contribute to team objectives* and *further organisational goals*. Grounded on regulatory focus theory, it was also confirmed that employees with promotive *job-based psychological ownership* will strive to set and *achieve personal targets* (through increased *self-investment*).

Support was also obtained for the hypothesis that *organisation-based psychological ownership* mediates the relationship between *job-based psychological ownership* and *accomplishing objectives*. *Accomplishing objectives*, in turn, positively influences *job-based psychological ownership* and satisfies an employee's *salient root needs.* This confirms the argument that through the successful accomplishment of objectives, an employee will obtain a better understanding of his/her level of performance, which in turn, should influence his/her sense of ownership towards the job (Pierce *et al.,* 2009). Additionally, successfully *achieving personal targets, contributing to team objectives* and *furthering organisational goals* fosters a greater sense of competence and satisfies the *root needs* of *efficacy and effectance*, *self-identity* and *belongingness.*

[82] This aspect of work performance refers to *achieving personal targets, contributing to team objectives* and *furthering organisational goals.*

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Lastly, the empirical evidence also supported the argument that *job-based psychological ownership* positively influences *applying specialist expertise.* This means that employees who have taken *psychological ownership* of their jobs will be motivated to *utilise/apply their specialist expertise in the job* itself and *to assist others or the organisation* at large. Moreover, they will also be willing to *share their expertise*.

The current study failed to corroborate the path-specific hypothesis that *job-based psychological ownership* positively influences an employee's *salient root needs*. The hypothesised feedback path, proposed by Lee (2017), from *psychological ownership* to *motivation to pursue the routes to psychological ownership* was statistically insignificant ($p>.05$). Consequently, since *psychological ownership* has its roots in and serves to satisfy the three fundamental human motives (Brown *et al.,* 2014), it was argued that feelings of *job-based psychological ownership* would rather influence the *salient root needs* and thus only indirectly the *motivation to pursue the routes to psychological ownership.* However, it appears that once the *root needs* are satisfied through the experience of *psychological ownership,* the need abates, or at least temporarily.

Although the *psychological ownership* structural model in the current study is more elaborate than the first-generation structural model proposed and empirically investigated by Lee (2017), there appears to be some overlap between the findings. After the removal of the polynomial latent variables from the model, Lee (2017) obtained close fit for the reduced *psychological ownership* measurement model. The reduced comprehensive *psychological ownership* LISREL model obtained reasonable fit, but due to an inadmissible ψ_{ii} estimate had to be modified again by removal of the path from *intimate knowledge* to *self-investment.* As mentioned, this reciprocal path was also deleted in the current study. It was concluded that Model B (the reduced *psychological ownership* structural model) with 11 paths (instead of the initially hypothesised 16 paths) displayed reasonable fit.

As in the current study, Lee (2017) also obtained support for the relationships between *individual psychological ownership needs (salient root needs)* and *motivation to pursue the routes, job characteristics* and *motivation to pursue the routes,* and *motivation to pursue the routes* and *self-investment.* Support was also obtained for the same relationships hypothesised between the *routes* that include *self-investment* to *control, self-investment* to *intimate knowledge,* and *control* to *intimate knowledge.* Lastly, Lee (2017) also obtained support for the influence of all three *routes* on *(job-based) psychological ownership*. The two paths that Lee (2017) failed to corroborate, namely the moderating effect of *psychological safety* on *motivation to pursue the routes* on *self-investment,* and the effect of *psychological*

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ownership on *motivation to pursue the routes*, were not included in the current study. Lee (2017) correctly theorised that *psychological safety* affects *self-investment*, but she got the nature of the effect wrong.

The empirical evidence in support of the former relationships therefore provided solid ground for the current study to modify and elaborate the first-generation *psychological ownership* structural model proposed by Lee (2017). The current study did not perform a response surface analysis[83] (to test the interaction effect between *individual's salient needs* and the *ability of the job characteristics to satisfy these salient needs* on the reaction of the *motivation to pursue the routes*). The current study also removed two of the paths in the reduced *first-generation* structural model (Model B) proposed by Lee (2017). Furthermore, the current study elaborated and added to the complexity of the model by adding six latent variables, 13 paths (of which only one path was not corroborated and two were not evaluated) and formally posited a mediation effect[84].

Overall, the second-generation *psychological ownership* model was reasonably successful in explaining variance in *job-based psychological ownership,* the focal latent variable of the study. This is based on the fact that 59% of the variance in feelings of ownership experienced by employees was explained by the revised *psychological ownership* model. Although this percentage is more than the 48% of variance explained by Lee's (2017) first-generation model, 41% of the variance in the current study was still explained by latent effects unaccounted for by the second-generation revised *psychological ownership* model. This illustrates that the model does not provide a complete description of the mechanism regulating *job-based psychological ownership*, which emphasises the need for future research. With the latter in mind, and since the model only obtained reasonable or acceptable fit, the following managerial implications are therefore presented with some degree of caution.

6.3. MANAGERIAL IMPLICATIONS

A critical aspect of research is translating the theoretical findings into practical and managerial implications in order to equip organisations with this knowledge. The focal latent variable in the current study was *job-based psychological ownership*. The introductory

[83] The researcher was of the opinion that by creating an additional narrow focused model to investigate relationships with relevance to the variables already included in the structural model would be futile. In fact, Lee (2017, p. 310) argued that by assessing the models separately "a certain degree of meaningfulness is lost as the complexity of interrelationships within the model as a whole are not fully interpretable."

[84] It is acknowledged that the proposed structural model contains numerous indirect (or mediated) effects. Only the indirect effect of *job-based psychological ownership* on *accomplishing objectives,* mediated by *organisation-based psychological ownership* was formally tested.

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argument presented in Chapter 1 led evidence in support of the position that *job-based psychological ownership* is an important psychological state worthy of the practical attention of industrial psychologists. The findings in the current study bolster that argument by indicating that *psychological ownership* statistically significantly ($p<.05$) affects important favourable work-related outcomes. More specifically, the strongest relationships in the proposed structural model was the influence that *job-based psychological ownership* had on *applying specialist expertise*, on *employee creativity and entrepreneurial behaviour,* and on *organisation-based psychological ownership.* The effect of *organisation-based psychological ownership* on *accomplishing objectives* was also considered to be substantial. *Psychological ownership* would thus be a beneficial psychological state for organisations to cultivate and foster in their employees.

Because the level of *job-based psychological ownership* is complexly determined, purposeful and rational interventions aimed at enhancing *job-based psychological ownership* can only succeed if they successfully optimise the levels of the direct and indirect determinants of ownership. These interventions therefore need to be rooted in a valid explanatory structural model. Valid explanatory structural models, such as the one that emerged from the current study will, however, not in and by itself prescribe or dictate practical steps that will increase the level of *job-based psychological ownership* experienced by employees. These steps have to be derived through creative operational theorising from the valid explanatory structural model.

The critical question to consider when proposing possible interventions is to first determine whether the direct and indirect determinants are malleable or non-malleable latent variables[85]. Milkovich, Boudreau and Milkovich (2008) distinguish between flow and stock interventions. Flow interventions are typically directed at affecting non-malleable determinants of the latent variable that the intervention targets. Examples of flow interventions include recruitment, selection, promotion, down-sizing, and job rotation. In the case of selection and promotion, flow interventions utilise measured operational definitions (Kerlinger & Lee, 2000) of the non-malleable direct and/or indirect determinants of *job-based psychological ownership* (in this case) as predictors to assign prospective or existing employees in accept or rejected treatments (Cronbach & Gleser, 1965). Measures of the non-malleable direct and/or indirect determinants of *job-based psychological ownership* are

[85] The simple dichotomous distinction between latent variables as either malleable or non-malleable might be an oversimplification. The extent to which a latent variable is malleable should maybe not be reduced to a binary variable, but rather be thought of as a continuous variable where it is easier or more difficult to influence or transform the level of the latent variable through external actions.

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therefore used to predict whether individuals eligible for consideration would display acceptable levels of *psychological ownership* in the job for which applicants are considered.

Stock interventions, in contrast, are typically directed at affecting malleable determinants of the latent variable that the intervention targets. Stock interventions affect the target latent variable by attempting to optimise the standing of current employees on the malleable determinants of the target latent variable to a sufficient degree to have their expected standing on the target latent variable exceed a specified standard. Examples of stock interventions include training and development, job enrichment, financial incentives, leadership development and team building. Stock interventions in effect are experimental operational definitions (Kerlinger & Lee, 2000) of the malleable direct and/or indirect determinants of *job-based psychological ownership*. The expectation is therefore that the experimental manipulation of the direct and/or indirect malleable determinants *of job-based psychological ownership* will nudge the levels of the these malleable latent determents to levels more conducive to *job-based psychological ownership*[86].

The *psychological ownership* structural model shown in Figure 6.1 depicts a psychological mechanism that operates over time from left to right (and via feedback loops again from right to left)[87]. It therefore makes sense to examine the practical possibilities through which the direct and indirect determinants of *job-based psychological ownership* can be affected, in a manner that will enhance the level of ownership experienced by employees, by working through the model from left to right.

This line of reasoning raises the question whether it makes any sense to move along the sequential operation of the psychological mechanism beyond *job-based psychological ownership*, to the down-stream outcomes of ownership, when considering practical ways of enhancing employee *job-based psychological ownership*? These down-stream outcomes are important if they directly and/or indirectly (positively) feed back on *job-based psychological ownership* or on its direct and/or indirect determinants. The whole feedback loop then, in essence, forms a natural stock intervention that dynamically affects (as a function of existing levels of *job-based psychological ownership*) future levels of *job-based*

[86] To experimentally operationally define a specific malleable latent variable η_j that has been shown to directly or indirectly affect *job-based psychological ownership*, however, requires that determinants of this specific latent variable should be validly understood (ξ_j). The experimental manipulation in reality does not involve the direct manipulation of η_j, but rather the manipulation of the denotations of its determinants ξ_j.

[87] When thinking about the psychological mechanism underpinning *job-based psychological ownership* in this manner, strictly speaking, the structural model should have been depicted as a longitudinal model and should have been tested via longitudinal SEM. Testing a model of this size via longitudinal SEM would, however, present a formidable, if not an insurmountable obstacle.

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psychological ownership. The structural model developed and tested in the current study made provision for three such feedback loops.

The first was a direct feedback loop from *job-based psychological ownership* to the *salient root needs*. Support was not obtained for this hypothesised path. The second was the hypothesised negative feedback loop from *job-based psychological ownership* to *self-investment*, which could not be tested. Lastly, the *psychological ownership* model developed in the current study hypothesised a three-component feedback loop in which *job-based psychological ownership* positively affects *organisation-based psychological ownership*, which in turn positively affects *accomplishing objectives*, which finally positively affects the *salient root needs*. Support was found for this feedback loop in a far as all three paths comprising the indirect effect were found to be statistically significant[88].

The question therefore, more specifically, is whether the two mediating latent variables feeding the influence of *job-based psychological ownership* back on to the root cause of *job-based psychological ownership* (i.e. *organisation-based psychological ownership* and *accomplishing objectives*) should be considered when reflecting on managerial practical *job-based psychological ownership* interventions? Or should the feedback loop be left to operate on its own as a natural stock intervention? The current study would argue that the latter option would probably not be wrong, but suboptimal. Stated differently, the question is whether the feedback loop, as a natural intervention, can be boosted through interventions that focus on the mediating latent variables that constitute the feedback loop?

The two mediating latent variables in the feedback loop (i.e. *organisation-based psychological ownership* and *accomplishing objectives*) are not perfectly determined by the model (as Table 5.43 attests). The effect of *organisation-based psychological ownership* on *accomplishing objectives* can therefore be enhanced, beyond the effect of *job-based psychological ownership,* by targeting the other (as yet unknown) direct and/or indirect determinants of *organisation-based psychological ownership* and *accomplishing objectives* with appropriate interventions. Likewise, the effect of *accomplishing objectives* on *salient root needs* can be enhanced beyond the effect of *organisation-based psychological ownership* by targeting the other (as yet unknown) direct and/or indirect determinants of *accomplishing objectives* with appropriate interventions (depending on whether these latent determinants are malleable or non-malleable). Since the current *psychological ownership*

[88] The indirect effect was not formally manually calculated and its statistical significance was not formally evaluated as a separate analysis. This is acknowledged as a methodological limitation. It is recommended that future research should, as a matter of routine, test the statistical significance of multi-component feedback effects. Nevertheless, Appendix F shows that the total effect *of job-based psychological ownership* on the *salient root needs* was statistically significant ($p<.05$).

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structural model did not develop hypotheses on the additional determinants that produce variance in *organisation-based psychological ownership* and *accomplishing objectives*, practical recommendations will necessarily be more tentative as they will have to be based purely on hypothesised effects. Performance management, and training and development seem to be appropriate interventions that could be used to bolster the effect of a*ccomplishing objectives* on the *salient root needs.* Appropriate additional interventions to bolster the effect of *organisation-based psychological ownership* on *accomplishing objectives* are less apparent. With that said, based on the results of the study, there are a few steps management can take in order to enhance the levels of *psychological ownership* experienced by employees.

Firstly, the results indicate that *job characteristics* play an important role in determining the levels of *job-based* and ultimately *organisation-based psychological ownership* experienced by employees. Brown *et al*. (2014) emphasised that through the arousal and satisfaction of the *salient root needs*, complex jobs (jobs with *skill variety, task identity, task significance, autonomy* and *feedback*) are able to create conditions whereby, over time, if the opportunity offered by the job is psychologically embraced (i.e. the employee invests the self in the job), employees experience *psychological ownership*. This means that job design and job redesigning should be considered. Jobs should be stimulating, challenging and complex. Organisations should design jobs that allow for increased levels of *skill variety, task identity, task significance, autonomy* and *feedback*[89]*.*

Viewed from the routes perspective, it is important that an employee's job offers a certain degree of freedom and the opportunity for *self-investment*, the opportunity to take *control of the job* and to gain resultant *intimate knowledge.* Job design is an important factor as it either facilitates or hinders the ability to take *control of the job* (Hackman & Oldham, 1980). Pierce and Peng (2015, p. 165) also argued that in order to enhance both *job-based* and *organisation-based psychological ownership* "managers should empower their employees by enabling them to exert control over their work." Therefore, the extent to which not only the job, but also the organisation structure (in terms of span of control, centralisation and formalisation) provides an employee the opportunity to take *control* plays a pivotal role in the process.

[89] As mentioned in Lee (2017), the particular *job characteristics* that should be developed or increased in a job to have the most significant influence on levels of *psychological ownership* is yet to be determined by further empirical research. In line with this, before redesigning a job, it is important to determine the interaction between the individual *job characteristics* and *psychological ownership root needs*.

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Along the same lines, jobs should enable employees to engage in job crafting. Job crafting involves the self-initiated change behaviour that individuals engage in when they redesign their own jobs (Berg, Dutton & Wrzesniewski, 2008). These include changes employees make in their work tasks, relationships at work, cognitions about work, and when they engage in self-initiated skill development (Tims, Bakker & Derks, 2012). Job crafting is a process that individuals engage in over time and fosters job satisfaction, resilience and engagement at work. (Berg *et al.,* 2008). Managers should ensure that employees are, in fact, able to craft their job characteristics. More specifically, ensuring employees have enough flexibility, autonomy and resources to make changes in their job. By providing employees the opportunity to craft their jobs, feelings of *efficacy and effectance* (desire to be the cause of changes in one's environment) are satisfied, while *self-investment* into the job itself, and taking *control of the job* is encouraged (Pierce *et al.,* 2001). This in turn, contributes to enhanced feelings of ownership towards the job and organisation.

Secondly, complex jobs become more attractive, and employees become more motivated to psychologically 'buy' the job, the more salient the root needs are (*effectance and efficacy, self-identity* and *belongingness*). The current study considers the *salience* of these root needs to not be (easily) malleable over short periods of time[90]. Over the short term, selection (and promotion), therefore, present themselves as possible intervention options. The question whether *job-based psychological ownership* should be the criterion (rather than a further downstream performance construct like *accomplishing objectives*) is controversial. From a labour legislation and moral perspective, it would be considered illegal and unethical to deny applicants a job opportunity based on a too low expected level of *job-based psychological ownership.* Furthermore, the extent to which feelings of ownership towards the job or organisation predict actual performance on the job (predictive validity) has not been demonstrated empirically.

Thirdly, the results of the current study indicated that *psychological meaningfulness* and *psychological safety* statistically significantly ($p<.05$) affected the levels of *job-based* and ultimately *organisation-based psychological ownership* experienced by employees. This claim could have been strengthened by also testing the statistical significance of the various indirect effects, in addition to the fact that all the components of numerous indirect effects were statistically significant ($p<.05$). The total effect of *psychological safety* on both *job-based* and *organisation-based psychological ownership* was found to be statistical

[90] The current model argues that the salience of root needs develops (indirectly) over a longer period of time as the result of past experiences of *job-based psychological ownership*. The results of the current study are compatible with this position. The current study does, however, not offer strong evidence in favour of such a position.

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significant (p<.05) when tested against a directional alternative hypothesis. The total effect of *psychological meaningfulness* on both *job-based* and *organisation-based psychological ownership* was found to be statistical significant (p<.05) when tested against a directional alternative hypothesis. Refer to Appendix G.

Managers should, therefore, focus on enhancing the extent to which employees experience *psychological meaningfulness* and *psychological safety* in their work. The results indicated that these two psychological states play an important role in employees' *motivation to pursue the routes to psychological ownership.* However, the current model's ability to assist in deriving appropriate practical interventions to enhance the extent to which employees experience *psychological meaningfulness* and *psychological safety* is limited. This is because the model does not explicate any of the determinants of these two latent variables (refer to footnote 86). Practical recommendations necessarily have to rely more generally on a larger *corpus* of valid research findings. Based on existing literature, *psychological meaningfulness* can be influenced through task characteristics[91], role characteristics and work interactions. For example, when employees do work that is creative, challenging (Kahn, 1990), and that provide skill variety and autonomy (Hackman & Oldham, 1980), it should result in experienced *psychological meaningfulness*. Furthermore, it is also important to ensure that employees have rewarding interpersonal interactions with co-workers and clients. Kahn (1990, p. 704) described the following conditions as conducive for the experience of *psychological meaningfulness*:

> People experienced such meaningfulness when they felt worthwhile, useful, and valuable - as though they made a difference and were not taken for granted. They felt able to give to others and to the work itself in their roles and also able to receive. Lack of meaningfulness was connected to people's feeling that little was asked or expected of their selves and that there was little room for them to give or receive in work role performances.

In terms of *psychological safety*, managers should focus on group and intergroup dynamics, management styles and process, and organisational norms. For example, resilient, supportive and clarifying management positively influences *psychological safety*. Kahn (1990, p. 708) described the following conditions as conducive for the experience of *psychological safety*:

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[91] This implies a suggested path in a future version of the *psychological ownership* structural model that the modification indices calculated for Γ and $\mathbf{B}$ were unable to suggest. Furthermore, in considering data-driven suggestions for model improvement LISREL 8.8 does not examine the possibility of paths between latent variables currently categorised as exogenous latent variables by sequentially reclassifying exogenous latent variables to endogenous latent variables. This suggested path resonates well with the Hackman and Oldham (1976) *job characteristics* model.

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> … situations promoting trust were predictable, consistent, clear, and non-threatening; people were able to understand the boundaries between what was allowed and disallowed and the potential consequences of their behaviors. When situations were unclear, inconsistent, unpredictable, or threatening, personal engagement was deemed too risky or unsafe.

Fourthly, support was also found for the argument that the success with which employees travel the *routes to psychological ownership* statistically significantly ($p<.05$) influence *job-based psychological ownership*. The question is whether it is possible, through additional interventions, to enhance the effect of the routes themselves by experimentally manipulating *self-investment,* gaining *intimate knowledge,* and taking *control of the job*? As argued under footnote 86, this requires insight into additional determinants[92] that affect the success with which the routes are travelled. The current model currently does not explicate these. Again, the following recommendations are, therefore, more tentative than they would have been if the model had made clear at least some of these additional latent determinants[93].

Gaining *intimate knowledge* is possible to the extent that the job is designed in such a way that employees receive direct and meaningful feedback on the extent to which they accomplished objectives (i.e. on the effectiveness of their performance) (Hackman & Oldham, 1976). Recognition of employees' work-related accomplishments fosters a sense of competence and influence, and provides employees with a better understanding of how their work affects the organisation's overall performance (Wagner *et al.,* 2003). This in turn, should lead to an increased sense of possession over the job and organisation. More specifically, feedback will give rise to feelings of *job-based psychological ownership*, as it provides an employee the opportunity to gain *intimate knowledge* of the job (Pierce *et al.,* 2009) and his/her level of performance. Managers should therefore implement processes that directly provide employees with constructive feedback when employees accomplish *personal* (*individual) work targets, contribute team objectives* and *further organisational goals.* This line of reasoning suggests that in future *psychological ownership* structural models, *job characteristics* should be allowed to directly affect the route of gaining *intimate knowledge* of the job, and not only *control of the job* (see footnote 92). As mentioned and supported by the current study, taking *control of the job* is possible to the extent that the job

[92] These include main effects and/or moderator variables that moderate the effect of the *motivation to pursue the routes* on the success with which the routes are travelled. These need not necessarily be additional latent variables that are not currently included in the model, but also refer to the freeing of paths that the model currently has fixed to zero.

[93] It should be noted (based on the argument presented in footnote 86) that suggestions on practical interventions to facilitate the traveling of the routes derived in the absence of the required guidance of the model, point to the identity of the omitted latent determinants of the success with which the *routes to psychological ownership* are travelled.

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is designed in such a way that employees have autonomy on the way they pursue the job objectives they are held accountable for (Hackman & Oldham, 1976).

Fifthly, it should be highlighted that managerial interventions will operate through their impact on the different elements of the *motivation to pursue the routes* (*expectancy* or *valence*). Support was found for the argument that the effect of the *salient root needs*, *job characteristics*, *psychological meaningfulness* and *psychological safety* on *job-based psychological ownership,* is mediated by the strength of the *motivation to pursue the routes to psychological ownership* and traveling the *routes to psychological ownership*. The *motivation to pursue the routes to psychological ownership* is constituted by the multiplicative combination (over all salient outcomes) of the *valence* of salient outcomes associated with traveling the *routes to psychological ownership* and the *expectancy* that the outcomes will materialise. The current study regarded the outcomes associated with successfully traveling the routes to be feelings of ownership and enhanced self-identity, control of the job and intimate knowledge/familiarity[94]. The current study would theorise that the *valance* of these outcomes depend on the *salience of the root needs*. The *expectancy* that pursuit of the *routes to psychological ownership* will result in these outcomes is theorised to depend on the *job characteristics*. The manner in which improvements in the *job characteristics* and the enhancement of the *salience of the root needs* affect the *motivation to pursue the routes to psychological ownership* are, therefore, in terms of this line of reasoning different. *Psychological safety,* for example, was theorised to also affect the *motivation to pursue the routes to psychological ownership* via the expectancy that negatively valanced outcomes will result from traveling the routes.

Sixthly, the findings indicate that *organisation-based psychological ownership* emerges as employees experience feelings of *job-based psychological ownership*, which in turn arises out of employees engaging in the three *routes* (*self-investment* into the job, *intimate knowledge* of the job, and taking *control of the job*). In other words, in order to enhance feelings of *organisation-based psychological ownership*, efforts can be focused on increasing *job-based psychological ownership.* Peng and Pierce (2015) suggest that this too can be accomplished via job redesign, which may also be an easier, less costly and disruptive manner to bring about ownership than through major organisational redesign.

[94] These latent variables do not refer to the actions that constitute the *routes*, but rather to consequences for the employee of successfully traveling the routes. It is acknowledged that these latent variables are not currently included in the model. They are, however, implied in the argument that traveling the *routes* result in the experience of *job-based psychological ownership* that satisfies the *salient root needs*.

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6.4. LIMITATIONS OF THE STUDY

The first limitation relates to the sampling technique, the methods of participant recruitment and the representativeness of the sample. Since the current study investigated feelings of *psychological ownership* experienced by employees, operationalising the target population via a sampling population that minimises the sampling gap presented an insurmountable challenge. Furthermore, organisations are generally reluctant to partake in the data collection of a research study that seemingly provides them with no return on their efforts. It is acknowledged that the non-probability sampling technique of convenience sampling in the form of emails to organisations and a post on Facebook and LinkedIn is a shortcoming of the current study. Although the lucky draw proved to be very beneficial in increasing employees' motivation to participate in the study and the resultant sample size, it also had some limitations. Using a lavish incentive may have motivated individuals to participate in the study purely for the potential reward, while failing to invest cognitive energy into the posed questions. Responses that were completed below a certain cut-off time were therefore removed in order to combat this problem. It was also argued that by using two social media platforms, the diversity of the sample may have been jeopardised due to the demographics of the participants being similar to that of the researcher. Consequently, the sample was not representative of the South African workforce or any particular country outside of South Africa. This in turn, decreases the generalisability of the finding.

The second limitation is that all of the measurement instruments were all self-report scales. This limitation is more pronounced for the scales that generally would require an objective rating of performance. These include the *employee creativity and entrepreneurial behaviour*, *accomplishing objectives* and *applying specialist expertise* scales. Future research should therefore consider using data from multiple sources.

The third limitation relates to the complex internal structure of some of the multidimensional latent variables that may not have been accurately captured or portrayed in the *psychological ownership* structural model. Although the subdimensions of these variables were accurately assessed empirically, the model did not explicitly reflect or investigate their influence or how the various dimensions are grafted separately into the model. These variables include the *salient root needs*, *job characteristics, motivation to pursue the routes*, *employee creativity and entrepreneurial behaviour, accomplishing objectives* and *applying specialist expertise.* For example, the *salient root needs,* namely *efficacy and effectance, self-identity,* and *belongingness* were investigated collectively. This limited the extent to which the influence of these individual *root needs* and their desired and actual satisfaction

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determine levels of *job-based psychological ownership.* The same limitation also applies to the *job characteristics* latent variable in that *autonomy, task identity, skill variety, task significance* and *feedback* may have different effects on the levels of *job-based psychological ownership.* The concepts of expectancy, valence and instrumentality that underly motivation were collectively represented as *motivation to pursue the routes*, while *creativity* and *entrepreneurial behaviour* (distinct yet related) were also combined into a single variable. The manner in which the three subdimensions that comprise *accomplishing objectives* and *applying specialist expertise* structurally relate to *psychological ownership* was also not explicated in the current model. The fact that these aforementioned multidimensional variables were reflected in a somewhat simplistic manner is a shortcoming of the current study and provides direction for future empirical research.

Lee (2017) used the modification indices calculated for the two regression coefficient matrices **B** and Γ to adapt her model. The current study extended Lee's (2017) adapted structural model. Ideally, Lee's (2017) adapted model should have been cross-validated before attempting to extend it. Future research should consider regularly cross-validating prior structural models before initiating attempts to extend them[95].

6.5. RECOMMENDATIONS FOR FUTURE RESEARCH

The subsequent section outlines recommendations for future research from a data and theoretical perspective.

6.5.1. Data-driven recommendations

The data-driven recommendations are made based on the modification indices for the gamma and beta matrices (Table 6.1 and Table 6.2, respectively). These provide an indication of changes and additional paths that would statistically significantly ($p<.01$) improve the fit of the model. If these data-driven suggestions were to make substantive theoretical sense, they provide direction for future research.

Diamantopoulos and Siguaw (2000) caution against blindly implementing the additional paths suggested by the modification indices. They argue firstly, that changes or modifications to the model should make sense from a theoretical and substantive point of view and that the sign of the suggested path should correspond with the theoretical argument. Secondly, the magnitude of the standardised expected change should be interpreted in conjunction with the modification indices. It should be sufficiently large to justify the modification or addition (Lee, 2017). Lastly, parameters should be implemented

[95] The contribution of the external assessor in pointing out the need for cross-validation is gratefully acknowledged.

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or 'relaxed' one at a time. In other words, should the largest medications index fail to meet the latter criteria, the following largest modification index value should be interpreted.

As mentioned in Chapter 5, the modification indices for Γ indicated 13 paths, if set free, would statistically significantly (p<.01) improve the fit of the model. The modification indices for $\mathbf{B}$ indicated 37 paths, if set free, would statistically significant (<.01) improve the fit of the model. It should be noted that this does not mean that freeing all 13 paths (Γ) and 37 paths ($\mathbf{B}$), would necessarily statistically significantly (p<.05) improve the fit of the model. The effect of freeing each currently fixed path has been evaluated individually, one at a time. If any of these suggestions would be implemented, the modification index values for all the remaining currently fixed parameters would change.

Inspection of Table 6.1 and Table 6.2 revealed that the largest modification index was the suggested path from c*ontrol of the job* to *motivation to pursue the routes* (β_{52}). The second largest modification index was the suggested path from *control of the job* to *self-investment* (β_{53}). After some reflection and theorising it was determined that the path suggested by the largest modification index did not make theoretical sense, but that the second largest modification index did. By taking *control of the job*, the root need of *efficacy and effectance* is satisfied (Pierce *et al.,* 2003). As the job becomes an extension of the self through the employee's control over it (Ellwood, 1927), an employee will therefore be motivated to invest more of the self in order to protect, maintain and enhance that association. It could thus be argued that taking *control of the job* could feed back onto an employee's propensity to invest even more of him-/herself into the job. Moreover, the expected change for the statistically significant (p<.01) suggested path from *control of the job* to *self-investment* was sufficiently large (3.992) to warrant its implementation.

When the initial *psychological ownership structural* model was fitted to the data, the two reciprocal paths (between *intimate knowledge* and *self-investment*, and between *job-based psychological ownership* and *self-investment*) proved to be the culprits of the inadmissible values. Nevertheless, the suggested reciprocal path from *control* to *self-investment* was investigated due to its compelling theoretical nature. When fitting the *psychological ownership* structural model again with this additional path, LISREL issued a warning that the model or solution could not converge after 900 iterations. Consequently, the next largest modification index was interpreted.

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Table 6.1

Modification Indices for Gamma

	JC	SAFETY	MEANING
ROOTS	0.0570	4.2329	8.5710**
MOTIV	- -	- -	- -
INVEST	**72.3597****	4.1605	**106.1208****
KNOW	6.0797	0.7769	1.9763
CONTROL	- -	46.7637**	8.9989**
JOB_PO	11.0874**	17.0962**	24.7387**
CREATIV	2.5641	5.2529	10.7394**
EXPERTIS	3.2805	1.6482	9.9461**
ORG_PO	0.1666	2.1398	4.2499
OBJECTIV	38.1237**	30.1950**	58.5672**

** (p<.01); ROOTS: salient root needs; MOTIV: motivation to pursue the routes; INVEST: self-investment route; KNOW: intimate knowledge route; CONTROL: control of the job route; JOB_PO: job-based psychological ownership; CREATIV: employee creativity and entrepreneurial behaviour; EXPERTIS: applying specialist expertise; ORG_PO: organisation-based psychological ownership; OBJECTIV: accomplishing objectives

Table 6.2

Modification Indices for Beta

	ROOTS	MOTIV	INVEST	KNOW	CONTROL	JOB_PO	CREATIV	EXPERTIS	ORG_PO	OBJECTIV
ROOTS	- -	0.6349	0.3148	2.5447	2.2613	- -	1.3950	0.0001	0.1479	- -
MOTIV	- -	- -	52.0445**	2.7597	**223.1994****	15.7920**	1.0931	9.9427**	0.0275	10.8557**
INVEST	2.2376	- -	- -	0.0052	**210.8469****	4.6023	13.6724**	0.9600	3.2876	11.8881**
KNOW	0.0531	8.6184**	- -	- -	- -	- -	0.0055	5.4348	25.6286**	16.3141**
CONTROL	3.3721	- -	- -	9.1342**	- -	15.4306**	0.7506	12.9710**	2.1596	0.3969
JOB_PO	2.8735	6.1385	- -	- -	- -	- -	53.4879**	20.7858**	1.2685	- -
CREATIV	4.7624	19.4071**	35.4559**	10.7335**	21.9609**	- -	- -	38.3249**	6.4008	21.6183**
EXPERTIS	2.7046	35.9343**	13.6459**	11.4899**	0.0060	- -	32.2092**	- -	0.4132	47.0520**
ORG_PO	1.1187	3.1308	4.8113	12.7393**	9.3171**	- -	5.0255	0.3573	- -	28.8626**
OBJECTIV	1.8353	54.1350**	36.6455**	**76.2701****	24.3487**	**63.8975****	43.7002**	**93.1164****	- -	- -

** (p<.01); ROOTS: salient root needs; MOTIV: motivation to pursue the routes; INVEST: self-investment route; KNOW: intimate knowledge route; CONTROL: control of the job route; JOB_PO: job-based psychological ownership; CREATIV: employee creativity and entrepreneurial behaviour; EXPERTIS: applying specialist expertise; ORG_PO: organisation-based psychological ownership; OBJECTIV: accomplishing objectives

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The third largest modification index was the suggested path from *psychological meaningfulness* to *self-investment* (γ_{33}). This path made sense from a theoretical and substantive point of view. *Psychological meaningfulness* refers to the "feeling that one is receiving a return on investments of one's self in a currency of physical, cognitive or emotional energy" Kahn (1990, pp. 703-704). As discussed in Chapter 2, it is one of the three psychological states (meaningfulness, safety and availability) that leads to personal engagement in work roles. Personal engagement in turn, refers to the extent to which employees express themselves cognitively, emotionally and physically during role performance (Kahn, 1990). It was argued that personal engagement appears to be conceptually similar to the route of *self-investment* as the investment of one's effort, time, energy and attention into objects "causes the self to become one with the object and to develop feelings of ownership towards that object" (Pierce *et al.,* 2001, p. 302). In other words, it could be argued that the extent to which an employee experiences *psychological meaningfulness* should positively influence his/her *self-investment* into the job. Moreover, the expected change for the statistically significant ($p<.01$) suggested path from *psychological safety* to *self-investment* was sufficiently large (.610) to warrant freeing it. The position that *psychological meaningfulness* affects *self-investment* is already acknowledged by the current model, albeit mediated by the strength of the *motivation to pursue the routes to psychological ownership*, and not directly.

The *psychological ownership* structural model was consequently fitted with the additional suggested path from *psychological meaningfulness* to *self-investment*. The results indicated that both the exact fit null hypothesis, tested via the Satorra-Bentler scaled chi-square (χ^2= 760.586; $p<.05$) and the close fit null hypothesis, had to be rejected ($p<.05$). In comparison to the comprehensive LISREL model, the RMSEA estimate decreased from .077 to .072. In other words, the fit improved somewhat due to the addition of the suggested path. Furthermore, the γ path coefficient estimate for the additional path (γ_{33}) was statistically significant ($p<.05$) (indicated by the unstandardised gamma matrix) and of satisfactory magnitude (.629) (indicated by the completely standardised gamma matrix). This means that the relationship from *psychological meaningfulness* to *self-investment* was corroborated. It should also be highlighted that the variance explained in the focal latent variable, *job-based psychological ownership,* increased from 59% to 61%. This path should therefore be included the model, should the structural model proposed in the current study be used in future empirical research.

The fourth largest modification index was the suggested path from *applying specialist*

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expertise to *accomplishing objectives* ($\beta_{10,8}$). Although this path involved interrelationships of the down-stream consequences of *psychological ownership*, this path also made substantive theoretical sense. In the current study, the multidimensional construct *accomplishing objectives* refers to employees *achieving personal targets, contributing to team objectives* and *furthering organisational goals* (Saville *et al.,* 2013). The empirical findings of the study revealed that employees who have taken *psychological ownership* of their jobs are more likely to *share* (their) *expertise,* and *utilise/apply* (their) *specialist expertise* either *in the job* or to *assist others/the organisation*. It could be argued that these individuals will be motivated to use their *intimate knowledge* of the job (i.e., job-relevant *specialist expertise*) in order to *accomplish objectives*. As argued in Chapter 2, employees should be willing to *share* (their) *expertise,* if this in turn should *further organisational goals*. They would also be more willing to *utilise/apply specialist expertise in the job* in order to *achieve personal targets.* Lastly, *utilising/applying specialist expertise to assist others/the organisation* could be positively related to *contributing to team objectives.* This suggested path therefore seems viable for future research.

The following modification indices also hold potential for future research as they seemed, to some degree, to make substantive and theoretical sense. This firstly includes the suggested path from gaining *intimate knowledge* to *accomplishing objectives* ($\beta_{10,4}$). Employees who have taken ownership of their jobs are more likely to have gained *intimate knowledge* of their jobs (as it constitutes one of the routes). In line with the argument in the previous paragraph, employees with enhanced *intimate knowledge* of the job should be better able to *accomplish objectives* (or willing to use their *intimate knowledge* of the job in order to *accomplish objectives*). However, the current model includes gaining *intimate knowledge* as a *route* (i.e., action/experience) *to psychological ownership*, and not as an outcome variable. This, therefore, suggests that *intimate knowledge* should be added to the model as a latent outcome variable and that *intimate knowledge* should be allowed to influence *accomplishing objectives*. Secondly, the suggested path from *job characteristic* to *self-investment* (γ_{31}) could also be investigated as the five *job characteristics* may either hinder or facilitate an employee's ability or opportunity to *invest the self* into the job. Lastly, the current study investigated the indirect relationship between *job-based psychological ownership* and *accomplishing objectives* ($\beta_{6,10}$), mediated by *organisation-based psychological ownership.* However, the direct path from *job-based psychological ownership* to *accomplishing objectives* ($\beta_{10,6}$) suggested by the modification index, holds potential for future research. It could be argued that if an employee has *job-based psychological ownership* he/she will be

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motivated to *achieve personal targets* (through increased *self-investment*) and to satisfy need for *efficacy and effectance,* and *self-identity*. The employee should then also want to *contribute to team objectives*, especially if the job entails working in a team. Moreover, *job-based psychological ownership* should influence an employee to *further organisational goals* due to an increased sense of responsibility towards the job, which is embedded in the larger organisation. The concern is, however, that this argument seems to imply that the effect of *job-based psychological ownership* on *accomplishing objectives* is mediated by (at least) *motivation to perform* (or *work motivation*).

6.5.2. Theory-driven recommendations

From a theoretical perspective, there are several fruitful future research directions related to *psychological ownership.* First and foremost, it is suggested that any future empirical work done on the construct of *psychological ownership* should also utilise a cross-cultural sample. However, it is advised to rather focus on a few specific countries, while increasing the representativeness of the sample from those countries. This should increase the generalisability of the findings. An ideal platform that provides opportunity for this is Amazon Mechanical Turk (MTurk)[96]. The current study had a limited number of respondents that were employed outside South Africa. The objectives of the current study did not include the investigation of the structural invariance of the *psychological ownership* structural model. Moreover, the number of non-South African respondents were far too few to allow a structural invariance study.

As mentioned in Lee (2017), future research could focus on additional contextual or environmental factors that influence the levels of *psychological ownership* experienced by employees. More specifically, aspects such as organisational culture and climate, technology, and the role of leadership could be investigated.

Dawkins *et al*. (2017) suggest that there seems to be a need for future research regarding the influence of key individual difference variables and personality traits. More specifically, conscientiousness holds potential for an effect on *job-based psychological ownership,* as this trait consists of characteristics such as persistence, reliability, dependability and achievement-orientation (Barrick & Mount, 1991). Additionally, Organ and Lingl (1995) suggest that individuals high in this trait tend to become highly involved in their job. The claim that individual differences (such as personality traits) may impact “how an individual goes about pursuing relationships with ownership objects and the types of objects deemed

[96] MTurk is a crowdsourcing platform that can be used by businesses and individuals to outsource their processes and jobs to a distributed and global workforce who can perform these tasks virtually (MTurk, 2018).

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suitable" (Pierce *et al.,* 2003, p. 95), illustrates the need for future research in this area.

In the current study, the *root needs* were conceptualised collectively as *salient root needs*. The reciprocal relationship between the various *roots* and *routes* holds potential for future research. For example, Brown *et al*. (2014) discussed the reciprocal relationship between the various *roots* and *routes*, but they did not focus on the *salience* of these motives and how they influence the interaction with the *routes*. In other words, future research could investigate each of the individual *psychological ownership root needs* (*efficacy and effectance, self-identity, belonging* and even *stimulation*) separately. More specifically, the "strength of one's innate motives for the routes of psychological ownership, both within and between individuals" (Dawkins *et al.,* 2017, p. 177) seem to be an avenue for future research.

As explained previously, the complexity of the variable *motivation to pursue the routes* may not have been accurately captured or portrayed in the model proposed in the current study. It is therefore recommended that future studies consider dissecting the construct into its hypothesised components (valence, expectancy and instrumentality) and explicitly testing this line of reasoning. Furthermore, it was also highlighted that the current *psychological ownership* model failed to include the psychological mechanism that drives the *motivation to perform* (by only incorporating the *motivation to pursue the routes*). An intriguing possibility to consider is whether the effect of *motivation to perform* (or *work motivation*) on job performance does not also (at least partially) operate via the *routes to job-based psychological ownership*. More specifically, through *investing the self* and by taking *control of the job.*

Job characteristics was also incorporated as a single multidimensional latent variable in the structural model. The question should be posed whether the dimensions of *job characteristics* differentially affect the *routes to psychological ownership*. Pierce, Jussila, and Cummings (2009) suggested that the different dimensions of *job characteristics* affect *psychological ownership* via different routes. More specifically, Pierce *et al*. (2009) argue that *task identity*, *task significance*, *skill variety* and *feedback* should affect *psychological ownership* via *investing the self,* whereas *autonomy* should affect *psychological ownership* via the *control* route. It is suggested that future research consider unbundling the *job characteristics* latent variable and consider ways of accommodating the proposed differential effect of the dimensions of this latent variable on the *routes to psychological ownership* in the structural model. The problem is that the Kriek-Lee model, in contrast to the Pierce *et al*.'s (2009) thinking, sees *motivation to pursue the routes to psychological*

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ownership as a latent variable that mediates the effect of *job characteristics* on the *routes to psychological ownership*.

In terms of the outcomes of *psychological ownership,* there is an opportunity for investigating the dark side of *psychological ownership*. Pierce and Jussila (2011) claim that this is an area in the current literature that has received limited attention. According to Dawkins *et al*. (2017) the integration with theories concerning aspects such as burnout (Maslach & Goldberg, 1998), escalation of commitment (Sleesman, Conlon, McNamara & Miles, 2012) and workaholism (Oates, 1970) should be considered.

Even though the current study has indicated a direct influence between *job-based psychological ownership* and *organisation-based psychological ownership* (Peng & Pierce, 2015), there is still limited research on *job-based psychological ownership's* antecedents and outcomes (Dawkins *et al.,* 2017). It seems somewhat easier and more comfortable investigating feelings of *organisation-based psychological ownership* due to the larger amount of existing research. However, more research, especially in South Africa, is required for *job-based psychological ownership* and exactly which dimensions of work performance it is structurally related to.

The modification indices are only capable of suggesting paths between ξ_j and η_i and between η_j and η_i. Modification indices cannot suggest paths between the exogenous latent variables of the model. The *job characteristics*, especially *skill variety, task identity* and *task significance*, according to Hackman and Oldham (1980), affect the experience of *meaningfulness* of work. It is, therefore, recommended that future research consider the inclusion of a path from *job characteristics* to *psychological meaningfulness*.

Some of the practical recommendations that were proposed alluded to determinants that were not explicitly included in the current model. More specifically, the fact that the model did not acknowledge determinants of *psychological safety, psychological meaningfulness*, and the two mediating latent variables in the feedback loop (i.e., *organisation-based ownership* and *accomplishing objectives*) points to the identity of omitted latent determinants of the success with which the *routes to psychological ownership* are travelled. It is therefore recommended that future studies should study these practical suggestions to infer the latent variables implied by the suggested interventions.

Lastly, the current study investigated *psychological ownership* on an individual level. However, the work conducted by Pierce and Jussila (2010) investigated feelings of ownership on a group-level. It is therefore recommended that future research should also

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examine *job-based psychological ownership* from a collective perspective, as a shared psychological state. This may be especially fruitful in South African as a collectivistic context.

6.6. CONCLUSION

The current study adds to the theoretical knowledge regarding what latent variables and critical psychological conditions create variance in *job-based psychological ownership* and its reciprocal relationship with work related performance outcomes. It was permissible to conclude that the latent variables that comprise the second-generation *psychological ownership* structural model were operationalised successfully. Based on the findings, the revised *psychological ownership* structural model provides a valid account of the psychological mechanism underpinning levels of *psychological ownership* experienced by employees and the reciprocal relationship of performance outcomes creating additional variance in *psychological ownership*. Despite several outlined limitations, it can be concluded that the study achieved its main purpose and stated objectives.

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APPENDIX A

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STELLENBOSCH UNIVERSITY LETTER OF INSTITUTIONAL PERMISSION FOR RESEARCH STUDY

Modification, elaboration and empirical evaluation of a psychological ownership structural model.

To whom it may concern,

This letter sets out to request permission for a research study to be conducted within your organisation. Research into the complex psychological constructs that underpin the behaviour of working man is necessary in order to understand the complex network of latent variables that underpin employee behaviour. This will inevitably inform interventions geared towards the effective and efficient use of society's most precious resource, human capital. One such complex construct within the network of latent variables underpinning behaviour of working man is *psychological ownership*. *Psychological ownership* is a unidimensional, intrapersonal psychological state (affective, cognitive and conative) in which an employee develops an attachment to a target of ownership (job or organisation), through the satisfaction of certain human motives (roots) and resultant experiences (routes). Research has demonstrated several positive outcomes of the development and nurture of levels of *psychological ownership* within the work place. These include but are not limited to increased performance, job satisfaction, tenure, organisational commitment and decreased levels of absenteeism. It is a critical psychological state that a company needs to cultivate and foster in its employees if it wishes to attain competitive advantage in the market.

In order to successfully develop and manage the levels of *psychological ownership* experienced by employees within organisations, to aid in individual flourishing and ensure optimal organisational performance, a valid understanding of the manner in which the construct of *psychological ownership* is embedded in this complex nomological network of latent variables is critical. Research surrounding the concept of *psychological ownership* needs to address some unanswered questions concerning the processes through which *psychological ownership* develops within an individual and how it structurally relates to performance, as a target (job) becomes an inherent part of an individual's identity. Through a valid understanding of the determinants that directly and indirectly affect the levels of *psychological ownership* that employees experience and the manner in which they structurally combine in the nomological network, HR management will be able to rationally and purposefully affect the work behaviour and well-being of employees and develop appropriate interventions to harness this psychological construct within the workplace. This in turn, could ultimately lead to improved organisational performance.

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We hereby request permission to conduct our research within your organisation. The Psychological Ownership Questionnaire will be administered for the purpose of the study, via the Stellenbosch University web-based e-Survey service (Sunsurveys). The appropriately mandated person in your organisation will be asked to send out an email message prepared by the researchers to the employees of your organisation containing a link to the electronic questionnaire.

Participants can choose whether to be in this study or not. If they volunteer to be in this study, they may withdraw at any time without consequences of any kind. Participants are not waiving any legal claims, rights or remedies because of their participation in this research study. No direct payment will be made to participants or the organisation for taking part in this study. However, participants that do take part in the study will be eligible for an entry into a lucky draw to win a stay at a five-star luxury lodge.

Any information that is obtained in connection with this study that could potentially be identified with participants, will remain confidential and will be disclosed only with their permission or as required by law. Confidentiality will be maintained by means of a coding procedure, restricting access to data and only reporting results in aggregate format. Furthermore, should the results of this research study be used for publication in academic or peer reviewed journals, confidentiality will be maintained. Neither the identity of the organisation, nor participant's names will be revealed in any publication of the research finding.

If there are any questions or concerns about the research, please feel free to contact Amor Gita Kriek (gitakriek@gmail.com / 072 183 3892), or Professor Callie Theron of the Department of Industrial Psychology of Stellenbosch University (ccth@sun.ac.za / 084 273 4139).

We trust that you will kindly grant us the institutional permission to conduct the *psychological ownership* study in your organisation. Thanking you in anticipation.

Kind regards,

Amor Gita Kriek

Professor Callie Theron

I …… (insert name of organisational representative) declare that I have been properly mandated by …… (insert name of organisation) to provide the necessary institutional permission for Amor Gita Kriek and Professor Callie Theron to collect data from employees of this organisation via the Psychological Ownership Questionnaire hosted on the Stellenbosch University web-based e-Survey service (Sunsurveys) under the stipulated conditions.

Signed in …….. (indicate place) by …… (insert name of the organisational representative) on …… (enter date).

…… (Signature)

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APPENDIX B

STELLENBOSCH UNIVERSITY

CONSENT TO PARTICIPATE IN RESEARCH

MODIFICATION, ELABORATION AND EMPIRICAL EVALUATION OF A PSYCHOLOGICAL OWNERSHIP STRUCTURAL MODEL.

You are invited to participate in a research study conducted by Amor Gita Kriek, a Master's student from the Department of Industrial Psychology in the Faculty of Economic and Management Sciences, at Stellenbosch University. The results of this study will contribute to the research component of the thesis and consequently the completion of Gita's studies. You were selected as a possible participant in this study because the study requires an investigation into full-time employed employees in the private sector. Your participation in this study is on a voluntary basis and would be greatly appreciated.

PURPOSE OF THE STUDY

The current study sets out to modify and elaborate an existing structural (theoretical) model, developed and tested by Lee (2017) that concerns the psychological state known as psychological ownership. The aim is thus to contribute to the accumulation of knowledge regarding the construct of psychological ownership. Moreover, the study sets out to identify other latent variables and critical psychological conditions, besides those identified by Lee (2017) that determine the level of psychological ownership that employees experience towards their job.

PROCEDURES

If you volunteer to participate in this study, you will be asked to complete a 20 minute questionnaire. Please set aside a quiet time and place to complete this questionnaire and ensure that you are connected to the internet. The questionnaire should take no longer than 20 minutes to complete. Please answer the questions as honestly as possible, while bearing in mind there are no right or wrong answers. The questions all pertain to your current job and organisation. The questionnaire will be anonymous and no questions that could expose your identity will be asked. The responses you provide will be captured electronically and automatically stored for processing.

POTENTIAL RISKS AND DISCOMFORTS

The current study poses no foreseeable harmful risks other than the discomforts or inconvenience of setting aside approximately 20 minutes of your time to complete the questionnaire. If you do not want to participate in the study, you will be able to withdraw before or during participation in the study.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Unfortunately, there is no direct benefit for taking part in this study other than standing a chance to win a stay at a five-star luxury lodge. However, the development of the psychological ownerships structural model will assist in the development of interventions aimed at enhancing employee's feelings of ownership towards their job and organisation and ultimately increasing their work performance. Therefore, this research will be valuable to the academic community of Industrial Psychology, the researcher, the participant and society at large.

PAYMENT FOR PARTICIPATION

Neither the organisation, nor you, as the participant, will receive any payment for taking part in this study. However, by taking part in the study you will be eligible for an entry into a lucky draw to win a stay at a five-star luxury lodge. Participation in the lucky draw is not a prerequisite for completing the questionnaire and it is completely voluntary.

Once you have completed the questionnaire, you will be asked whether you want to participate in the lucky draw. If you answer "yes" a new survey will open whereby you will be invited to provide your cellphone number. This survey will in no way be linked to your responses provided in the first survey and the researcher will in no way be able to link a participant's results with his/her cellphone number. Once a randomly selected participant is awarded with the voucher, the remaining cellphone numbers will be deleted. No other participants will be contacted other than the winner.

CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of the following procedures.

Coding, storage and access to questionnaire data:

Since the questionnaires utilise a system that cleans the sending information, the researcher will not be able to identify the source of the questionnaire data. You will also not be asked any information that is directly linked to your identity. In other words, the information that you provide will be kept anonymous. Only Gita Kriek and Professor Theron of the Department of Industrial Psychology at Stellenbosch University will receive and have access to the data. By means of a password protected computer, access to the data will be restricted.

Results on the study:

The confidentiality and anonymity rights of all participants will be protected at all costs by the researcher. Once the study is completed, the full thesis will be available on the Stellenbosch Library's E-thesis portal. Furthermore, results will only be provided in aggregate format to the organisations whose employees took part in the research study. Since the information provided by each participant will be kept anonymous, should a participant desire to see this/her own results, the researcher will not even be able to provide it upon request.

Publishing results of study:

Should the research study be published within an academic environment, confidentiality of the results will be maintained, once again, by reporting it in aggregate format.

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PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without any negative consequences. You will be able to withdraw by closing the electronic survey. However, the researcher would like to request that you please do finish the provided questions, or the data obtained up until the point of withdrawal will be unusable. Should the need arise, the researcher may also withdraw you from the study.

IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact:
Amor Gita Kriek at 072-183-3892 or gitakriek@gmail.com
Professor Callie Theron, at the Department of Industrial Psychology at 084-273-4139 or ccth@sun.ac.za

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché (mfouche@sun.ac.za; 021-808-4622) at the Division for Research Development at Stellenbosch University.

- ○ I have read and understood the foregoing information and voluntarily consent to participate in the research under the stipulated conditions. I also agree that the information provided may be used for future research.
- ○ I have read and understood the foregoing information that was provided to me and would not like to participate in the research.

Thank you for your willingness to complete this Psychological Ownership Questionnaire.

General instructions:

1. Please read each statement carefully and answer honestly.
2. To select your response, click on the button that corresponds to the answer you require. If you wish to change your response simply click on the button that corresponds to your new response.
3. Try to use the full range of the scale, however, if you really feel you cannot answer, please select the 'Uncertain', 'Neutral' or 'Unsure' option.
4. There is no time limit, but you should work reasonably quickly.
5. **Please do not exit before you have completed the entire questionnaire.**

The questions below cover information pertaining to demographic information. The information will be used for statistical purposes only.

***Please indicate your gender:**

- ○ Male
- ○ Female

***Please indicate your race:**

- ○ Black
- ○ Coloured
- ○ Indian
- ○ White
- ○ Other: Please specify

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***Please indicate your age:**

- 16-20
- 21-25
- 26-29
- 30-34
- 35-39
- 40-50
- 51-60
- 61-70
- 71+

***Please indicate your highest qualification achieved:**

- Matric
- Diploma or certificate
- Undergraduate degree
- Postgraduate diploma
- Honour's degree
- Master's degree
- Doctorate
- Other

***Please indicate your country of residence:**

***Please indicate your field of work/industry:**

- Agriculture and agribusiness
- Communications – Media/Marketing/Advertising/PR
- Construction
- Consulting and business services
- Education
- Engineering
- Finance
- Government and public services
- Healthcare and health/fitness
- Information technology
- Mining and manufacturing
- Retail and consumer
- Tourism
- Transport and logistics
- I work across industries
- Other: Please specify

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***Please indicate your current job level:**

- ○ Entry level
- ○ Junior management
- ○ Middle management
- ○ Senior management
- ○ Other: Please specify

***Please indicate how long you have occupied your current job:**

- ○ Less than 1 year
- ○ 1-2 years
- ○ 3-5 years
- ○ 6-10 years
- ○ 11-20 years
- ○ 21+ years

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JOB CHARACTERISTICS

The following five questions ask you to describe your job, as objectively as you can, on a scale of one to seven. Please do not use this part of the questionnaire to show how much you like or dislike your job. Instead, try to make your descriptions as accurate and as objective as you possibly can.

***1. How much *autonomy* is there in your job? That is, to what extent does your job permit you to decide *on your own* how to go about doing the work?**

1	2	3	4	5	6	7
Very little; the job gives me almost no personal "say" about how and when the work is done			Moderate autonomy; many things are standardised and not under my control, but I can make some decisions about the work.			Very much; the job gives me almost complete responsibility for deciding how and when the work is done.

***2. To what extent does your job involve doing a *"whole" and identifiable piece of work*? That is, is the job a complete piece of work that has an obvious beginning and end? Or is it only a small part of the overall piece of work, which is finished by other people or automatic machines?**

1	2	3	4	5	6	7
My job is only a tiny part of the overall piece of work; the results of my activities cannot be seen in the final product or service.			My job is a moderate-sized "chunk" of the overall piece of work; my own contribution can be seen in the final outcome.			My job involves doing the whole piece of work, from start to finish; the results of my activities are easily seen in the final product or service.

***3. How much *variety* is there in your job? That is, to what extent does the job require you to do many different things at work, using a variety of your skills and talents?**

1	2	3	4	5	6	7
Very little; the job requires me to do the same routine things over and over again.			Moderate variety.			Very much; the job requires me to do many different things, using a number of different skills and talents.

***4. In general, *how significant or important* is your job? That is, are the results of your work likely to significantly affect the lives or well-being of other people?**

1	2	3	4	5	6	7
Not very significant; the outcomes of my work are not likely to have important effects on other people.			Moderately significant.			Highly significant; the outcomes of my work can affect other people in very important ways.

***5. To what extent does *doing the job itself* provide you with information about your work performance? That is, does the actual *work itself* provide clues about how well you are doing – aside from any "feedback" co-workers or supervisors may provide?**

1	2	3	4	5	6	7
Very little; the job itself is set up so that I could work forever without finding out how well I am doing.			Moderately; sometimes doing the job provides "feedback" to me; sometimes it does not.			Very much; the job is set up so that I get almost constant "feedback" as I work about how well I am doing.

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***Listed below are a number of statements which could be used to describe a job. Please indicate whether each statement is an *accurate* or an *inaccurate* description of *your* job by selecting the appropriate option from the seven point scale. Once again, please try to be as objective as you can in deciding how accurately each statement describes your job – regardless of whether you like or dislike your job.**

	Very Inaccurate	Mostly Inaccurate	Slightly Inaccurate	Uncertain	Slightly Accurate	Mostly Accurate	Very Accurate
1. The job requires me to use a number of complex or high-level skills.							
2. The job is arranged so that I can do an entire piece of work from beginning to end							
3. Just doing the work required by the job provides many chances for me to figure out how well I am doing.							
4. The job allows me to use a number of complex or high-level skills.							
5. This job is one where a lot of other people can be affected by how well the work gets done.							
6. The job gives me a chance to use my personal initiative and judgement in carrying out the work.							
7. The job provides me with the chance to completely finish the piece of work that I begin.							
8. After I finish a job, I know whether I performed well.							
9. The job gives me considerable opportunity for independence and freedom in how I do the work.							
10. The job itself is very significant and important in the broader scheme of things.							

SELF-INVESTMENT ROUTE

***Listed below are a number of statements that pertain your level of self-investment into your current job. Please indicate which is most true by selecting the appropriate option from the seven point scale.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. I have invested a major part of 'myself' into this job.							
2. I have invested many of my ideas into this job.							
3. I have invested a number of my talents into this job.							
4. I have invested a significant amount of my life into this job.							

CONTROL OF THE JOB ROUTE

***Listed below are a number of questions about the control you feel you have over your current job. Please indicate which is most true by selecting the appropriate option from the seven point scale.**

	Not at all	Very little	A small extent	Some extent	A moderate extent	A great extent	A very great extent
1. To what extent do you have influence over the things that affect you on the job?							
2. To what extent do you have input in deciding what tasks or parts of tasks you will do?							
3. To what extent do you influence job-related decisions that will affect you?							
4. To what extent do you set your own work deadlines?							
5. To what extent do you control the pace and scheduling of your work?							
6. In general, to what extent do you have control over your job?							

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INTIMATE KNOWLEDGE ROUTE

***Listed below are a number of statements that describe how familiar you feel with or how much knowledge you feel you have about your current job. Please indicate which is most true by selecting the appropriate option from the seven point scale.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. I am intimately familiar with what is going on with regards to my job.	○	○	○	○	○	○	○
2. I have a depth of knowledge as it relates to the job.	○	○	○	○	○	○	○
3. I have a comprehensive understanding of the work that I am asked to do.	○	○	○	○	○	○	○
4. I have a broad understanding of this job.	○	○	○	○	○	○	○

JOB-BASED AND ORGANISATION-BASED PSYCHOLOGICAL OWNERSHIP

***The following two sets of questions deal with the *'sense of ownership'* that you feel for your job and the organisation you work for. Please indicate the degree to which you *agree* or *disagree* with the following statements.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. I sense that this job is mine.	○	○	○	○	○	○	○
2. I feel a very high degree of personal ownership for this job.	○	○	○	○	○	○	○
3. I sense that this is my job.	○	○	○	○	○	○	○
4. I sense that the work I do as part of my job is mine.	○	○	○	○	○	○	○
5. I feel a very high degree of personal ownership for the work that I do.	○	○	○	○	○	○	○
6. The work I do at this organisation is mine.	○	○	○	○	○	○	○

*

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. This is my organisation.	○	○	○	○	○	○	○
2. I sense that this organisation is our company.	○	○	○	○	○	○	○
3. I feel a very high degree of personal ownership for this organisation.	○	○	○	○	○	○	○
4. I sense that this is my company.	○	○	○	○	○	○	○
5. I feel as if the company belongs to me.	○	○	○	○	○	○	○
6. I feel as if I am part-owner of this company.	○	○	○	○	○	○	○

PSYCHOLOGICAL SAFETY

***Listed below are a number of statements about how you feel while you are at work. Please indicate the degree to which you *agree* or *disagree* with the following statements.**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I feel free to be completely myself at work.	○	○	○	○	○
2. Expressing my true feelings is welcomed at work.	○	○	○	○	○
3. The feelings I express at work are my true feelings.	○	○	○	○	○
4. Nobody at work will pick on me if I have different opinions.	○	○	○	○	○
5. I can freely express my thoughts at work.	○	○	○	○	○

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PSYCHOLOGICAL MEANINGFULNESS

***Listed below are a number of statements about how you feel about your work. Please indicate the degree to which you *agree* or *disagree* with the following statements.**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The work I do on this job is very important to me.	○	○	○	○	○
2. My job activities are personally meaningful to me.	○	○	○	○	○
3. The work I do on this job is worthwhile.	○	○	○	○	○
4. My job activities are significant to me.	○	○	○	○	○
5. The work I do on this job is meaningful to me.	○	○	○	○	○
6. I feel the work I do on this job is valuable.	○	○	○	○	○

SALIENT ROOT NEEDS

***Listed below are a number of statements about personal needs that you may wish to fulfil through your job. Please indicate the extent to which the statements are true by selecting the appropriate option from the seven point scale.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. I have a desire for my job to be an extension of me.	○	○	○	○	○	○	○
2. I need to understand who I am within my job role.	○	○	○	○	○	○	○
3. I need my job to be an expression of who I am.	○	○	○	○	○	○	○
4. I desire to explore my own identity within my job role.	○	○	○	○	○	○	○
5. I have a desire to personalise my work space.	○	○	○	○	○	○	○
6. I have a desire to feel 'at home' in my job role.	○	○	○	○	○	○	○
7. I want my job to feel like 'familiar ground' to me.	○	○	○	○	○	○	○
8. I want my job to provide me with a sense of belonging.	○	○	○	○	○	○	○
9. I have a desire to take control of different aspects of my job.	○	○	○	○	○	○	○
10. I want to be able to make changes within my job.	○	○	○	○	○	○	○
11. I have the desire to want to control job outcomes.	○	○	○	○	○	○	○
12. I have a desire to be resourceful and solve problems within my job role.	○	○	○	○	○	○	○

MOTIVATION TO PURSUE THE ROUTES (VALENCE)

***Listed below are a number of job outcomes. How good (3) or bad (-3), do you evaluate the following outcomes?**

	-3	-2	-1	0	1	2	3
1. Being intimately familiar with your job.	○	○	○	○	○	○	○
2. Experiencing your job as an extension of yourself.	○	○	○	○	○	○	○
3. Having control over your job.	○	○	○	○	○	○	○
4. Having a depth of knowledge that relates to your job.	○	○	○	○	○	○	○
5. Your job defining who you are.	○	○	○	○	○	○	○
6. Having the ability to decide what tasks to do.	○	○	○	○	○	○	○
7. Having a broad understanding of your job.	○	○	○	○	○	○	○
8. Seeing your effort come to fruition in your job.	○	○	○	○	○	○	○
9. Having the ability to decide how things are done in your job.	○	○	○	○	○	○	○

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MOTIVATION TO PURSUE THE ROUTES (EXPECTANCY)

***If you personally engage with your job, in the sense that you psychologically and physically invest of yourself in your job, how likely are the following outcomes?**

	Extremely Unlikely	Unlikely	Somewhat Unlikely	Unsure	Somewhat Likely	Likely	Extremely Likely
1. Being intimately familiar with your job.							
2. Experiencing your job as an extension of yourself.							
3. Having control over your job.							
4. Having a depth of knowledge that relates to your job.							
5. Your job defining who you are.							
6. Having the ability to decide what tasks to do.							
7. Having a broad understanding of your job.							
8. Seeing your effort come to fruition in your job.							
9. Having the ability to decide how things are done in your job.							

EMPLOYEE CREATIVITY AND ENTREPRENEURIAL BEHAVIOUR

***Listed below are a number of statements related to creativity in your job. Please indicate the degree to which you *agree* or *disagree* with the following statements.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. I demonstrate originality in my work							
2. I take risks in terms of producing new ideas when doing my job.							
3. I find new uses for existing methods or equipment.							
4. I solve problems that have caused others difficulty.							
5. I try out new ideas and approaches to problems.							
6. I often generate new ideas by observing our customers.							
7. I generate novel, but operable work-related ideas.							
8. I generate ideas revolutionary to our field.							

***Listed below are a number of statements related to your job. Please indicate the degree to which you *agree* or *disagree* with the following statements.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. I often make innovative suggestions to improve our business.							
2. I often generate new ideas by observing the world.							
3. I often come to new ideas when observing how people interact with our products and services.							
4. I identify opportunities for new products/processes.							
5. I boldly move ahead with a promising new approach when others might be more cautious.							
6. I devote time to help others find ways to improve our products and services.							

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ACCOMPLISHING OBJECTIVES

***Listed below are a number of statements that pertain to your performance at work. Please indicate the degree to which you *agree* or *disagree* with the following statements.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. I tend to achieve personal targets I set for myself at work.	○	○	○	○	○	○	○
2. I tend to be relentless in my pursuit of the objectives I need to achieve.	○	○	○	○	○	○	○
3. I tend to be a person that succeeds at the work goals I set for myself.	○	○	○	○	○	○	○
4. A team can rely on me to contribute to team objectives.	○	○	○	○	○	○	○
5. The teams I belong to at work regard me as critical to the achievement of team objectives.	○	○	○	○	○	○	○
6. What I achieve in my work contributes significantly to organisational goals.	○	○	○	○	○	○	○
7. Furthering my organisation's goals is important to me.	○	○	○	○	○	○	○
8. My organisation can rely on me to contribute to the achievement of its goals.	○	○	○	○	○	○	○

APPLYING SPECIALIST EXPERTISE

***Listed below are a number of statements that pertain to your performance at work. Please indicate the degree to which you *agree* or *disagree* with the following statements.**

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. I tend to utilise my expert knowledge in my work.	○	○	○	○	○	○	○
2. I would like to use my specialist knowledge and expertise to assist others.	○	○	○	○	○	○	○
3. I want my specialist knowledge and expertise to contribute to making the organisation successful.	○	○	○	○	○	○	○
4. I tend to apply my specialist skills in my work.	○	○	○	○	○	○	○
5. I am motivated to share my knowledge and expertise with my colleagues.	○	○	○	○	○	○	○
6. I aspire to make my knowledge available for others to use.	○	○	○	○	○	○	○

***Do you wish to participate in the lucky draw to stand a chance to win a weekend at a five-star luxury lodge? Nedile Lodge is located in Welgevonden Game Reserve, South Africa. Your previous responses are in no way linked to the personal contact details you provide in this section.**

- ○ Yes
- ○ No

Thank you for completing the Psychological Ownership Questionnaire.

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APPENDIX C

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STELLENBOSCH UNIVERSITY

SAVILLE CONSULTING INSTRUMENT USAGE REQUEST

Modification, elaboration and empirical evaluation of a psychological ownership structural model.

To whom it may concern,

This letter sets out to request permission for the use of a performance instrument for research purposes. The construct of interest is *psychological ownership*; a unidimensional, intrapersonal psychological state (affective, cognitive and conative) in which an employee develops an attachment to a target of ownership (job or organisation), through the satisfaction of certain human motives (roots) and resultant experiences (routes). It is a crucial psychological state that a company needs to cultivate and foster in its employees if it wishes to attain competitive advantage in the market.

In order to successfully develop and manage the levels of *psychological ownership* experienced by employees within organisations, to aid in individual flourishing and ensure optimal organisational performance, a valid understanding of the manner in which the construct of *psychological ownership* is embedded in the complex nomological network of latent variables is critical. Research surrounding the concept of *psychological ownership* needs to address some unanswered questions concerning the processes by which *psychological ownership* develops within an individual and how it structurally relates to performance, as a target (job) becomes an inherent part of an individual's identity. This, in turn, could improve organisational performance as well as employee wellbeing.

We hereby request permission to use the Global Areas of the Saville Consulting Wave Performance 360 in our research study. More specifically, two of the three sections, namely *applying specialist expertise* and *accomplishing objectives,* in order to investigate the extent to which psychological ownership may influence *work effectiveness.* The final Psychological Ownership Questionnaire will be administered via the Stellenbosch University web-based e-Survey service (Sunsurveys). All required copyright and credit will be included in the questionnaire.

If there are any questions or concerns about the research, please feel free to contact Amor Gita Kriek (gitakriek@gmail.com / 072 183 3892), or Professor Callie Theron of the Department of Industrial Psychology of Stellenbosch University (ccth@sun.ac.za / 021 808 3009).

Kind regards,

Amor Gita Kriek

Professor Callie Theron

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APPENDIX D

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CONSENT TO PARTICIPATE IN RESEARCH

Modification, elaboration and empirical evaluation of a psychological ownership structural model.

You are invited to participate in a research study conducted by Amor Gita Kriek, a Master's student from the Department of Industrial Psychology in the Faculty of Economic and Management Sciences, at Stellenbosch University. The results of this study will contribute to the research component of the thesis and consequently the completion of Gita's studies. You were selected as a possible participant in this study because the study requires an investigation into full-time employed employees in the private sector. Your participation in this study is on a voluntary basis and would be greatly appreciated.

1. PURPOSE OF THE STUDY

The current study sets out to modify and elaborate an existing structural (theoretical) model, developed and tested by Lee (2017) that concerns the psychological state known as psychological ownership. The aim is thus to contribute to the accumulation of knowledge regarding the construct of psychological ownership. Moreover, the study sets out to identify other latent variables and critical psychological conditions, besides those identified by Lee (2017) that determine the level of psychological ownership that employees experience towards their job.

2. PROCEDURES

If you volunteer to participate in this study, you will be asked to complete a 20 minute questionnaire. Please set aside a quiet time and place to complete this questionnaire and ensure that you are connected to the internet. Please answer the questions as honestly as possible, while bearing in mind there are no right or wrong answers. The questions all pertain to your current job and organisation. The questionnaire will be anonymous and no questions that could expose your identity will be asked. The responses you provide will be captured electronically and automatically stored for processing.

3. POTENTIAL RISKS AND DISCOMFORTS

The current study poses no foreseeable harmful risks other than the discomforts or inconvenience of setting aside approximately 30 minutes of your time to complete the questionnaire. If you do not want to participate in the study, you will be able to withdraw before or during participation in the study.

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4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Unfortunately, there is no direct benefit for taking part in this study other than standing a chance to win a stay at a five-star luxury lodge. However, the development of the psychological ownerships structural model will assist in the development of interventions aimed at enhancing employee's feelings of ownership towards their job and organisation and ultimately increasing their work performance. Therefore, this research will be valuable to the academic community of Industrial Psychology, the researcher, the participant and society at large.

5. PAYMENT FOR PARTICIPATION

Neither the organisation, nor you, as the participant, will receive any payment for taking part in this study. However, by taking part in the study you will be eligible for an entry into a lucky draw to win a stay at a five-star luxury lodge. Participation in the lucky draw is not a prerequisite for completing the questionnaire and it is completely voluntary.

Once you have completed the questionnaire, you will be asked whether you want to participate in the lucky draw. If you answer "yes" a new survey will open whereby you will be invited to provide your cellphone number. This survey will in no way be linked to your responses provided in the first survey and the researcher will in no way be able to link a participant's results with his/her cellphone number. Once a randomly selected participant is awarded with the voucher, the remaining cellphone numbers will be deleted. No other participants will be contacted other than the winner.

6. CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of the following procedures.

- *Coding, storage and access to questionnaire data*: Since the questionnaires utilise a system that cleans the sending information, the researcher will not be able to identify the source of the questionnaire data. You will also not be asked any information that is directly linked to your identity. In other words, the information that you provide will be kept anonymous. Only Gita Kriek and Professor Theron of the Department of Industrial Psychology at Stellenbosch University will receive and have access to the data. By means of a password protected computer, access to the data will be restricted.
- *Results on the study:* The confidentiality and anonymity rights of all participants will be protected at all costs by the researcher. Once the study is completed, the full thesis will be available on the Stellenbosch Library's E-thesis portal. Furthermore, results will only be provided in aggregate format to the organisations whose employees took part in the research study. Since the information provided by each participant will be anonymous, should a participant desire to see this/her own results, the researcher will not even be able to provide it upon request.
- *Publishing results of study*: Should the research study be published within an academic environment, confidentiality of the results will be maintained, once again, by reporting it in aggregate format.

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7. PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without any negative consequences. You will be able to withdraw by closing the electronic survey. However, the researcher would like to request that you please do finish the provided questions, or the data obtained up until the point of withdrawal will be unusable. Should the need arise, the researcher may also withdraw you from the study.

8. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact:

- Amor Gita Kriek at 072 183 3892 or gitakriek@gmail.com
- Professor Callie Theron, at the Department of Industrial Psychology at 084 273 4139 or ccth@sun.ac.za

9. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché (mfouche@sun.ac.za; 021-808-4622) at the Division for Research Development at Stellenbosch University.

INFORMED CONSENT

Please select the statement that applies to you:

- ○ I have read and understood the foregoing information and voluntarily consent to participate in the research under the stipulated conditions. I also agree that the information provided may be used for future research.

- ○ I have read and understood the foregoing information that was provided to me and would not like to participate in the research.

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APPENDIX E

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NOTICE OF APPROVAL

REC Humanities New Application Form

13 February 2019

Project number: 6726

Project Title: Modification, elaboration and empirical evaluation of a psychological ownership structural model

Dear Ms Amor Kriek

Your REC Humanities New Application Form submitted on 8 February 2019 was reviewed and approved by the REC: Humanities.

Please note the following for your approved submission:

Ethics approval period:

Protocol approval date (Humanities)	Protocol expiration date (Humanities)
13 February 2019	12 February 2022

GENERAL COMMENTS:

Please take note of the General Investigator Responsibilities attached to this letter. You may commence with your research after complying fully with these guidelines.

If the researcher deviates in any way from the proposal approved by the REC: Humanities, the researcher must notify the REC of these changes.

Please use your SU project number (6726) on any documents or correspondence with the REC concerning your project.

Please note that the REC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

FOR CONTINUATION OF PROJECTS AFTER REC APPROVAL PERIOD

Please note that a progress report should be submitted to the Research Ethics Committee: Humanities before the approval period has expired if a continuation of ethics approval is required. The Committee will then consider the continuation of the project for a further year (if necessary)

Included Documents:

Document Type	File Name	Date	Version
Research Protocol/Proposal	Final draft_Psychological Ownership	27/03/2018	
Informed Consent Form	Informed consent	27/03/2018	
Request for permission	Institutional permission	27/03/2018	
Data collection tool	Data collection tool	28/03/2018	
Proof of permission	Wave Performance 360	28/03/2018	
Default	Turnitin Summary	10/04/2018	
Request for permission	Institutional permission	09/05/2018	
Default	Instrument usage request	11/05/2018	
Default	DESC Report A Kriek	11/05/2018	
Informed Consent Form	Informed consent	11/05/2018	
Data collection tool	FINAL_PsychologicalOwnershipQuestionnaire	08/02/2019	

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If you have any questions or need further help, please contact the REC office at cgraham@sun.ac.za.

Sincerely,

Clarissa Graham

REC Coordinator: Research Ethics Committee: Human Research (Humanities)

National Health Research Ethics Committee (NHREC) registration number: REC-050411-032.
The Research Ethics Committee: Humanities complies with the SA National Health Act No.61 2003 as it pertains to health research. In addition, this committee abides by the ethical norms and principles for research established by the Declaration of Helsinki (2013) and the Department of Health Guidelines for Ethical Research: Principles Structures and Processes (2nd Ed.) 2015. Annually a number of projects may be selected randomly for an external audit.

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Investigator Responsibilities

Protection of Human Research Participants

Some of the general responsibilities investigators have when conducting research involving human participants are listed below:

1.Conducting the Research. You are responsible for making sure that the research is conducted according to the REC approved research protocol. You are also responsible for the actions of all your co-investigators and research staff involved with this research. You must also ensure that the research is conducted within the standards of your field of research.

2.Participant Enrollment. You may not recruit or enroll participants prior to the REC approval date or after the expiration date of REC approval. All recruitment materials for any form of media must be approved by the REC prior to their use.

3.Informed Consent. You are responsible for obtaining and documenting effective informed consent using **only** the REC-approved consent documents/process, and for ensuring that no human participants are involved in research prior to obtaining their informed consent. Please give all participants copies of the signed informed consent documents. Keep the originals in your secured research files for at least five (5) years.

4.Continuing Review. The REC must review and approve all REC-approved research proposals at intervals appropriate to the degree of risk but not less than once per year. There is **no grace period.** Prior to the date on which the REC approval of the research expires, **it is your responsibility to submit the progress report in a timely fashion to ensure a lapse in REC approval does not occur.** If REC approval of your research lapses, you must stop new participant enrollment, and contact the REC office immediately.

5.Amendments and Changes. If you wish to amend or change any aspect of your research (such as research design, interventions or procedures, participant population, informed consent document, instruments, surveys or recruiting material), you must submit the amendment to the REC for review using the current Amendment Form. You **may not initiate** any amendments or changes to your research without first obtaining written REC review and approval. The **only exception** is when it is necessary to eliminate apparent immediate hazards to participants and the REC should be immediately informed of this necessity.

6.Adverse or Unanticipated Events. Any serious adverse events, participant complaints, and all unanticipated problems that involve risks to participants or others, as well as any research related injuries, occurring at this institution or at other performance sites must be reported to Malene Fouche within **five (5) days** of discovery of the incident. You must also report any instances of serious or continuing problems, or non-compliance with the RECs requirements for protecting human research participants. The only exception to this policy is that the death of a research participant must be reported in accordance with the Stellenbosch University Research Ethics Committee Standard Operating Procedures. All reportable events should be submitted to the REC using the Serious Adverse Event Report Form.

7.Research Record Keeping. You must keep the following research related records, at a minimum, in a secure location for a minimum of five years: the REC approved research proposal and all amendments; all informed consent documents; recruiting materials; continuing review reports; adverse or unanticipated events; and all correspondence from the REC

8.Provision of Counselling or emergency support. When a dedicated counsellor or psychologist provides support to a participant without prior REC review and approval, to the extent permitted by law, such activities will not be recognised as research nor the data used in support of research. Such cases should be indicated in the progress report or final report.

9.Final reports. When you have completed (no further participant enrollment, interactions or interventions) or stopped work on your research, you must submit a Final Report to the REC.

10.On-Site Evaluations, Inspections, or Audits. If you are notified that your research will be reviewed or audited by the sponsor or any other external agency or any internal group, you must inform the REC immediately of the impending audit/evaluation.

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APPENDIX F: TOTAL EFFECTS OF η_i ON η_j

	ROOTS	MOTIV_PO	INVEST	KNOWLEDG	CONTROL	JOB_PO	CREATIV	EXPERTIS	ORG_PO	OBJECTIV
ROOTS	0.0118*	0.0429*	0.0655*	0.0255	0.0616*	0.1395*	- -	- -	0.0859*	0.2696*
	(0.0058)	(0.0241)	(0.0379)	(0.0160)	(0.0352)	(0.0801)			(0.0237)	(0.0571)
	2.0548	1.7767	1.7280	1.5919	1.7496	1.7412			3.6304	4.7246
MOTIV_PO	0.2793*	0.0118*	0.0181*	0.0070*	0.0170*	0.0385*	- -	- -	0.0237*	0.0744*
	(0.0602)	(0.0058)	(0.0092)	(0.0040)	(0.0084)	(0.0192)			(0.0086)	(0.0237)
	4.6414	2.0548	1.9641	1.7475	2.0206	2.0071			2.7555	3.1343
INVEST	0.1217*	0.4410*	0.0079*	0.0031*	0.0074*	0.0168*	- -	- -	0.0103*	0.0324*
	(0.0295)	(0.0590)	(0.0041)	(0.0018)	(0.0037)	(0.0085)			(0.0040)	(0.0110)
	4.1277	7.4735	1.9424	1.7186	2.0045	1.9754			2.6077	2.9597
KNOWLEDG	0.0747*	0.2708*	0.4743*	0.0019*	0.2759*	0.0103*	- -	- -	0.0063*	0.0199*
	(0.0197)	(0.0452)	(0.0644)	(0.0011)	(0.0586)	(0.0054)			(0.0026)	(0.0071)
	3.7945	5.9865	7.3699	1.7050	4.7087	1.9250			2.4306	2.8101
CONTROL	0.0767*	0.2778*	0.1020	0.0019*	0.0047*	0.0106*	- -	- -	0.0065*	0.0204*
	(0.0242)	(0.0619)	(0.0663)	(0.0011)	(0.0023)	(0.0053)			(0.0029)	(0.0080)
	3.1702	4.4861	1.5382	1.7264	2.0073	1.9802			2.2409	2.5442
JOB_PO	0.0878*	0.3180*	0.4859*	0.1888*	0.4573*	0.0351*	- -	- -	0.0568*	0.1781*
	(0.0231)	(0.0463)	(0.0572)	(0.0615)	(0.0541)	(0.0088)			(0.0152)	(0.0455)
	3.8023	6.8651	8.4958	3.0726	8.4466	3.9881			3.7342	3.9100
CREATIV	0.0414*	0.1502*	0.2295*	0.0892*	0.2159*	0.4888*	- -	- -	0.0268*	0.0841*
	(0.0133)	(0.0322)	(0.0435)	(0.0312)	(0.0370)	(0.0703)			(0.0084)	(0.0236)
	3.1130	4.6602	5.2705	2.8599	5.8290	6.9537			3.1924	3.5658
EXPERTIS	0.0459*	0.1662*	0.2540*	0.0987*	0.2390*	0.5410*	- -	- -	0.0297*	0.0931*
	(0.0141)	(0.0332)	(0.0403)	(0.0343)	(0.0352)	(0.0648)			(0.0095)	(0.0271)
	3.2431	5.0017	6.2973	2.8801	6.7830	8.3492			3.1380	3.4358
ORG_PO	0.0409*	0.1482*	0.2265*	0.0880*	0.2132*	0.4825*	- -	- -	0.0265*	0.0830*
	(0.0116)	(0.0274)	(0.0387)	(0.0281)	(0.0314)	(0.0601)			(0.0068)	(0.0200)
	3.5146	5.4037	5.8520	3.1358	6.7941	8.0321			3.8715	4.1606
OBJECTIV	0.0130*	0.0472*	0.0722	0.0281*	0.0679*	0.1537*	- -	- -	0.3271*	0.0265*
	(0.0046)	(0.0135)	(0.0191)	(0.0108)	(0.0170)	(0.0355)			(0.0614)	(0.0068)
	2.8045	3.5008	3.7808	2.5854	4.0070	4.3319			5.3280	3.8715

* (p<.05); ROOTS: salient root needs; MOTIV: motivation to pursue the routes; INVEST: self-investment route; KNOW: intimate knowledge route; CONTROL: control of the job route; JOB_PO: job-based psychological ownership; CREATIV: employee creativity and entrepreneurial behaviour; EXPERTIS: applying specialist expertise; ORG_PO: organisation-based psychological ownership; OBJECTIV: accomplishing objectives

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APPENDIX G: TOTAL EFFECTS OF ξ_i ON η_j

	JOBCAR	SAFETY	MEANING
ROOTS	0.0346*	0.0110*	0.0051
	(0.0202)	(0.0065)	(0.0043)
	1.7151	1.7052	1.1860
MOTIV_PO	0.2697*	0.2606*	0.1205*
	(0.0611)	(0.0603)	(0.0629)
	4.4132	4.3225	1.9166
INVEST	0.1176*	0.1136*	0.0525*
	(0.0325)	(0.0286)	(0.0308)
	3.6141	3.9770	1.7044
KNOWLEDG	0.1753*	0.0697*	0.0322*
	(0.0382)	(0.0198)	(0.0194)
	4.5885	3.5154	1.6656
CONTROL	0.4541*	0.0715*	0.0331*
	(0.0643)	(0.0270)	(0.0197)
	7.0625	2.6502	1.6794
JOB_PO	0.2565*	0.0819*	0.0379*
	(0.0436)	(0.0236)	(0.0223)
	5.8851	3.4772	1.6970
CREATIV	0.1211*	0.0387*	0.0179
	(0.0268)	(0.0126)	(0.0112)
	4.5176	3.0752	1.6037
EXPERTIS	0.1341*	0.0428*	0.0198
	(0.0254)	(0.0136)	(0.0124)
	5.2797	3.1443	1.6005
ORG_PO	0.1196*	0.0382*	0.0177*
	(0.0237)	(0.0120)	(0.0105)
	5.0503	3.1702	1.6772
OBJECTIV	0.0381*	0.0122*	0.0056*
	(0.0110)	(0.0048)	(0.0037)
	3.4573	2.5521	1.5371

* ($p<.05$)

ROOTS: salient root needs; MOTIV: motivation to pursue the routes; INVEST: self-investment route; KNOW: intimate knowledge route; CONTROL: control of the job route; JOB_PO: job-based psychological ownership; CREATIV: employee creativity and entrepreneurial behaviour; EXPERTIS: applying specialist expertise; ORG_PO: organisation-based psychological ownership; OBJECTIV: accomplishing objectives